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An Illustrated Monthly Journal of Botany

Editors: A. A. HELLER and P. BEVERIDGE KENNEDY

Volume 7

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MUHLENBERGIA

JANUARY, 1911

Editors: A. A. HELLER and P. BEVERIDGE KENNEDY

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University of Nevada,
Reno, Nevada

Volume 7 February 7, 1911

MUHLENBERGIA

THE NORTH AMERICAN LUPINES—III

By A. A. Heller

A few days ago while referring to a letter written me by Dr. Greene, I discovered that one sentence had been carelessly read by me, and therefore I owe an apology to both Dr. Greene and Professor C. P. Smith. The passage is as follows:

"Lately I was well on the road to a description of a Californian annual species, which is here under the name of "*L. apricus*." I saw it was not at all that, and hunting further, I discovered that the thing had been published by you quite a while ago; your *L. persistens*" (*vallicola*).

Now, what I thought at the time, was that Dr. Greene considered *apricus* to be the same as my *vallicola*, and so informed Professor Smith. This should clear up the difficulty mentioned by him on page 135 of volume 6.

The latter part of May and a few days of early June, 1910, were spent by me in that wonderful country first made known botanically by Captain Meriwether Lewis, and a little later, but now nearly a century past, by that hardy explorer, David Douglas, who first discovered so many of our Pacific coast species. I refer to the Columbia river region. My main object was to study lupines at the places where Douglas collected his types, and this I was able to do in a satisfactory way, although it is necessary to spend several seasons there to cover all the ground. Among the species of which dependable material was obtained are *L. micranthus*, *bicolor*, *leucophyllus*, *plumosus*, *polyphyllus* and *sulphureus*. Two of these are treated in this paper, and the others will be mentioned later.

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LUPINUS MICRANTHUS Dougl.; Lindl. Bot. Reg. **15:** *pl. 1251.* 1829.

"If this is not to be compared in point of beauty with such fine species as L. perennis, ornatus and others, which have been already figured in this work from Mr. Douglas's collection, it is nevertheless interesting as an addition to the number of species of annual Lupines.

"According to Mr. Douglas, this has much affinity with Lupinus bicolor, published at fol. 1109 of this work, from which it differs in being more slender, and in flowering from four to six weeks earlier. It is more particularly to be distinguished from that species by the shortness of its alae, its nearly sessile flowers, fleshy leaves, granulated roots, larger pods, and the colour and size of the seeds.

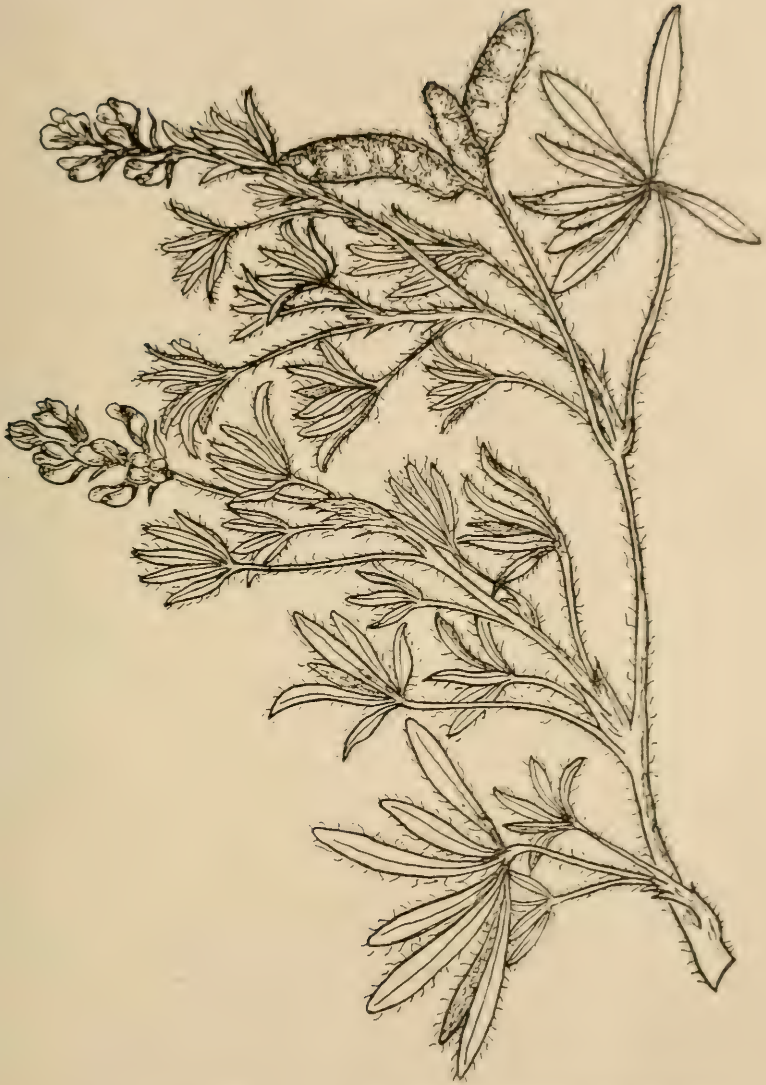
"Mr. Douglas found it abundantly upon the gravelly banks of the southern tributaries of the Columbia, and in barren ground in the interior of California.

"A hardy annual, flowering from May to July. Our drawing was made in the Garden of the Horticultural Society in 1828.

"'Annual. Root fibrous, with warty, fleshy tubercles. Stem erect, branching, about a foot high, with short white downy hairs. Leaves digitate, with subulate, dark stipules. Leaflets 5-7, linear-spatulate, smooth above, ciliate with minute, short, fine hairs below, thick and fleshy, three-fourths of an inch long. Flowers partly whorled, few, sessile. Bracteae subulate pilose, darker than the leaves. Calyx silky, upper lip bifid, under entire. Vexillum ovate, blue, white in the centre, with two or four parallel black dots. Alae oblong, same length as the vexillum; keel falcate, acute: Legumen linear-oblong, with transverse furrows, 5 or 6-seeded. Seeds large, brownish gray, mottled.'—*Douglas.* J. L."

The above is the original description of *L. micranthus*, except that the Latin description, immediately preceding the first paragraph quoted is omitted as unnecessary, the English one being a translation of it.

Plate 1



Lupinus micranthus Dougl Reproduced from the original plate

As early as 1835, Agardh reports "specimina Californica vidi in Hb. Lindleyi."

Watson, in Proc. Am. Acad. **8**: 525. 1873, records it as occurring from Puget Sound to Southern California." His remark "near the last" (*nanus*), indicates that he had a very vague conception as to the identity of this species, notwithstanding the fact that he had access to the original description and illustration. He also indicates that he had seen a specimen collected by Douglas, but fails to state whether it was from the Columbia river region or from California, an important point, viewed in the light of our present knowledge.

Greene, Flora Franciscana, 38. 1891, says: "Common everywhere; but not at all agreeing with either the figure or description in the Botanical Register; and the type was from a very different and quite distant region of our western country, the upper Columbia River." He should have said lower Columbia river. While disagreeing with the Watsonian disposition of the species, he nevertheless adopted it, but significantly placed immediately after it his recently described *L. polycarpus*, with four species between it and *nanus*, an admirable and fitting arrangement, well graded steps in the matter of relationship.

Last May I collected on the Columbia river just below Hood River, Oregon, a plant which is undoubtedly true *micranthus*, my no. *10100* (figure 1). It is abundant in open grassy places, and was observed at several places along the railroad between Cascade Locks and Hood River. The leaves are somewhat succulent, and while the opening flower heads are rather compact at first, they soon present the lax appearance shown in the original illustration. Very few seeds were secured, but sufficient to show that they are "large, brownish gray, mottled." They are 3.5 mm. long, 3 mm. wide.

Having accepted the usual interpretation of *micranthus*, for my studies had not led me to carefully look into the status of this species, my surprise was great when I found nothing in the type region that agreed with my preconceived ideas, but instead a plant much resembling the western middle Californian *L. polycarpus*. That it was no chance immigrant was shown by the fact that it was the only form found over a large extent of territory, ranging from the upper Willamette valley to the banks of the Columbia, and up that stream to the eastern flank of the Cascade mountains.

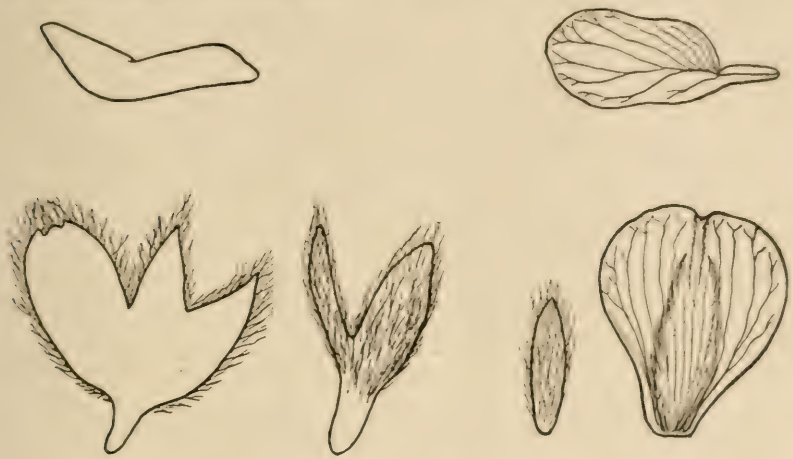


Figure 1. Floral parts of *Lupinus micranthus*, enlarged.

As Professor C. P. Smith has recently affirmed, his study based upon my Hood River specimens, the nearest relative of *micranthus* is *L. polycarpus* Greene, and Douglas' specimen from California cited by Agardh, if it really is from California, is in all probability *L. polycarpus*. Douglas had not yet collected in California when *L. micranthus* was published, having penetrated southward only as far as the headwaters of the Willamette. The latter part of the sentence describing its habitat "in barren ground in the interior of California," seems best applicable to eastern Oregon or Washington, but it may refer to the upper Willamette region. Were the date of collection or observation given, the place could easily be fixed. If *micranthus* is found at all in California, it will no doubt be as an introduction and not as a native.

The flowers are described as sessile, though Lindley in his explanatory remarks says "nearly sessile," and this is correct, for they have quite short pedicels, 2 mm. or less. They turn pale in drying, as do also the flowers of *polycarpus*. The lower calyx lobe is not entire as described, but broad and shortly 3-toothed when spread out.

When the Californian plants now referred to *micranthus* are carefully studied, they will be found to consist of a mixture of several species, and none of them closely related to true *micranthus* unless perhaps *L. umbellatus*, which I suspect is often labeled *micranthus* in southern California.

LUPINUS BICOLOR Lindl. Bot. Reg. **13:** *pl. 1109.* 1827.

(With cover illustration)

As recently pointed out by Professor C. P. Smith in this journal (**6:** 136), the plants which in California have commonly been called *L. bicolor* are not that species at all. He, however, was not the first to call attention to the matter, for in Flora Franciscana 39, Greene notes: "Sandy soil about San Francisco, in a slender depressed very hairy form; also on gravelly crests of the Oakland Hills, where it is stouter, with ascending branches. The two may well be distinct species; and neither plant agrees perfectly with the original *L. bicolor* of the Columbia River." The plant from the Oakland hills was no doubt Greene's *L. apricus*.

Under the original description, the habitat of this species is given as "in the interior of the country about the Columbia River, from Fort Vancouver to the branches of Lewis and Clark's River, always on dry gravelly soil under the shade of trees in the open plains."

Fort Vancouver was located in what is now known as Mill Plain, a short distance from the present thriving town of Vancouver, Wash. Our own government now maintains an important army post at Vancouver, but the Fort Vancouver of Douglas' time was maintained by an English fur company.

Last May it was my privilege to visit Vancouver, and the first plant collected after proceeding up the river past the inclosure of the military reservation was *Lupinus bicolor*, growing on an open grassy slope within the town limits, or at least inside the built-up portion. But there were no trees there to shade it, although they may have been there in former times. From the first glimpse of the plant there was no doubt concerning its identity. The few flowered whorls and the wide spacing between the apices of banner and wing, so well shown in the original plate, at once settled the matter.

Lindley describes the calyx as without bractlets between the lobes, but upon close examination they are found to be present. The lower lobe is said to be entire, but is slightly 3-toothed. Unless the lobes are flattened out, minute toothing is apt to be overlooked, even in living specimens. The seeds are just as described, "clouded with greenish-brown [areas of minute dots], having on each side a dark oblique line." They are 3.5 mm. long, 3 mm. wide.

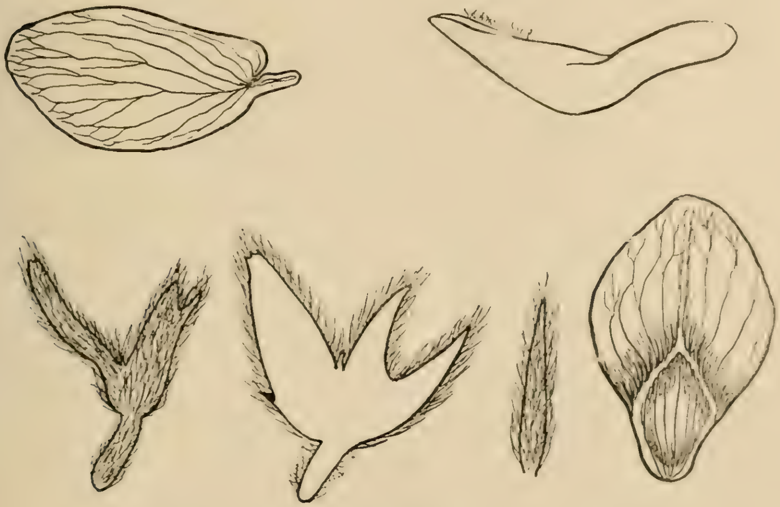
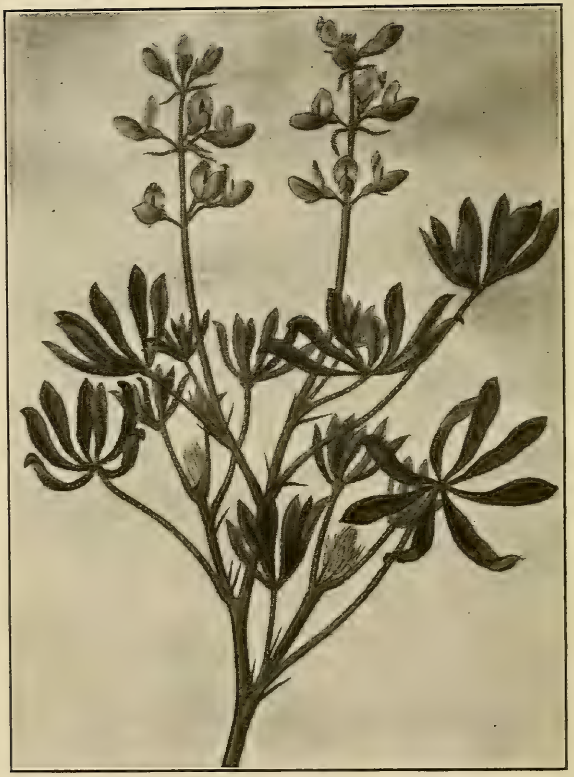


Figure 2. Floral parts of *Lupinus bicolor*, enlarged.

Piper, at the time his flora was published, had seen no specimens of this species from Washington. Besides my *10069* from Vancouver, from which the accompanying illustration of the floral parts is taken, I have several specimens collected by John Macoun in the vicinity of Victoria, British Columbia. Two of these have pink flowers. So far I have seen nothing from south of the Columbia river that can be referred to *bicolor*.

The cover illustration was copied from the original plate at Stanford University through the kindness of Professor Abrams.

Plate 2



Lupinus bicolor Lindl · Reproduced from the original plate

This, together with the figure of the floral parts here presented, should enable any one to determine whether he has *L. bicolor*.

Lupinus sabulosus

Annual: stems several, widely spreading, the lowermost prostrate, finally 2 dm. long, the ascending or erect ones 1 dm. long, silky pilose, as is the whole plant, leafy: petioles slender, 4 cm. long or less; leaflets 5 to 8, commonly 6, 12 mm. long, 2 to 3 mm. wide; stipules subulate, 5 mm. long: peduncles up to 6 cm. long, rather stout: inflorescence short, even in fruit not exceeding 3 cm.: flowers in 1 to 2 whorls: bracts linear-lanceolate, early deciduous, 4 mm. long: calyx lobes nearly equal, the upper 4 mm. long, deeply parted, the acute segments with a broad sinus between, their apices slightly incurved, 4 mm. wide at the apex when spread out, a little narrower at base; lower lobe 5 mm. long, with 3 short teeth, 4 mm. broad at base, 1 mm. at apex when spread out, strongly convex and appearing as if entire when fresh: corollas 7 mm. long and as deep, space between apices of banner and wings 5 mm.; deep violet-blue except the face of the banner, which is white changing to red-purple, with several dark blotches along the groove, the sides turned

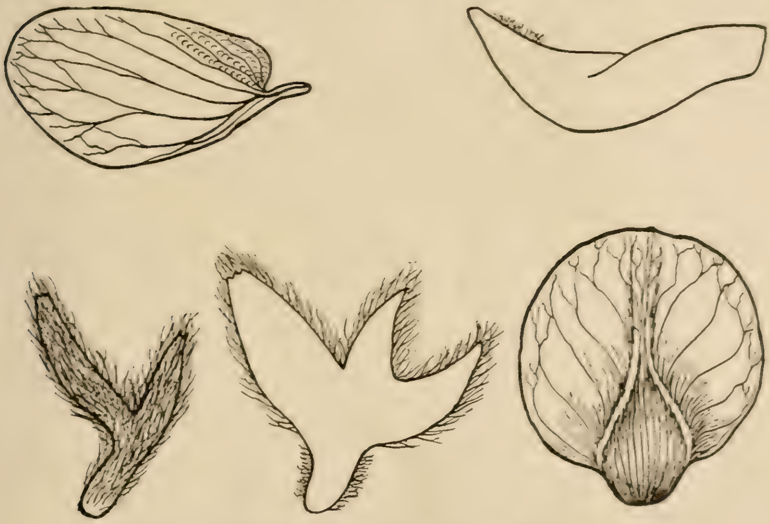


Figure 3. Floral parts of *Lupinus sabulosus*, enlarged.

back and parallel above, flaring below; wings strongly inflated, open and exposing the keel for nearly its whole length; keel but moderately curved, ciliate toward the purple apex: mature pods 25 mm. long, 5 mm. wide, 8-seeded: seeds 2.5 mm. long, 2 mm. wide, pale, marbled and mottled with deep brown.

The type, in the herbarium of A. A. Heller, is *Heller 6627*, collected April 25, 1903, on sand hills near the Marine Hospital, San Francisco, California, distributed as *Lupinus micranthus.*

In 1907 I again collected this species in sand near Ocean View, San Mateo county, and distributed it as *L. bicolor*, suggesting in Muhlenbergia **2:** 292, that San Francisco "may really be the type locality," basing my opinion on Piper's remark (Cont. U. S. Nat. Herb. **11:** 353) that "the species seems to be common in California, and extends into Oregon, but no specimens from Washington have been seen." But this theory of mine would have to be abandoned, even withont having re-collected *bicolor* at Vancouver, Washington, the type locality, for Douglas did not visit San Francisco until four years after it was published.

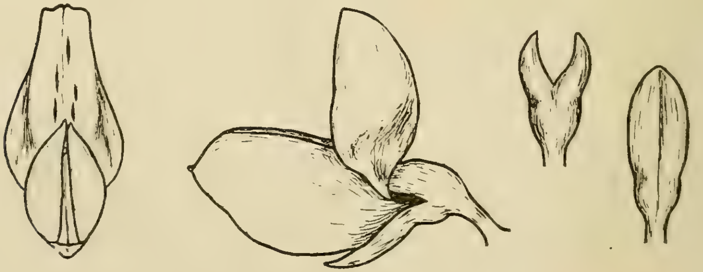


Figure 4. *Lupinus sabulosus*, flower and calyx, natural shape

Between 1903 and 1907 I had studied the description and plate of *L. bicolor*, and came to the conclusion as did Professor Smith, recently expressed in this journal (**6:** 137), that the sand loving plant of the San Francisco peninsula is identical with *L. bicolor*. I still held that view until a few days ago, and had included it under my notes on *bicolor* for this paper. But a careful study of the dissected floral parts of the two shows them to be distinct. The differences are well shown in the accompanying illustrations of the two species.

The seeds of *L. sabulosus* are considerably smaller, darker, the mottling of a rich brown, and exhibit no trace of the dark oblique line so prominent on those of *L. bicolor*.

TWO NEW SPECIES FROM COLORADO

By George E. Osterhout

Schmaltzia pubescens sp. nov.

A low shrub about 1 m. high, the branches of the year, the petioles, and the leaves, whitish with a dense pubescence, the branches remaining so for a year or two: the leaflets of the trifoliate leaf sessile on the petiole, the terminal leaflet largest, averaging about 2 cm. long, cuneate at base, slightly three lobed at the end, the middle lobe with three rounded teeth, the lateral ones with two, the lower leaflets broadly cuneate at base or rounded, 1 to 1.5 cm. long, some of them lightly lobed, some crenate at the end, slightly darker on the upper surface: flowers and fruit in a dense glumerule, the berries deep red, 5 to 6 mm. in diameter, thickly pubescent with comparatively long hairs.

The type specimens were obtained near Rule creek, Bent county, Colorado, June 9, 1910, no. *4306*. This *Schmaltzia* seems to be nearest related to *S. Emoryi* Greene, but the thick pubescence is whitish and not so long as in *S. Emoryi*, and it seems to be a smaller shrub. It differs from all other Colorado species of *Schmaltzia* which I have seen in its dense pubescence.

The species of *Schmaltzia* in Colorado differ much from each other. One on the plains near New Windsor has a small leaf, slightly pubescent on the lower surface, and light green; its berries are deep red, slightly pubescent with short hairs. This I take to be *S. trilobata* (Nutt.) Greene. The shrub growing in the foothills has a much larger leaf, darker in color, very slightly pubescent, its fruit lighter in color, nearly glabrous. I take this to be *S Bakeri* Greene. Dr. Greene's *S. cognata*, described from Baker, Earle and Tracy's no. *525*, collected at Durango, seems to be the same as Baker's no. *406*, collected at Cimarron, and does not differ greatly from *S. Bakeri*. There is a species of western Colorado which may be *S. quercifolia* Greene. Dr. Greene has also described two other species from Colorado, *S. subpinnata* from the canyon of the Arkansas at Canon City, and *S. oxyacanthoides* from Grand Junction. These two I have not seen. However, there are several species of *Schmaltzia* in Colorado, and not one, as some botanists have supposed.

Carduus vernalis sp. nov.

Perennial from a deep root, 2 to 4 dm. or more high, strict and having one or two heads on the smaller plants, or branched and having numerous heads on the large: stems with some tomentum at the time of flowering: leaves all narrowly linear, white tomentose beneath, green with slight tomentum above, the lower about 1 dm. long, scarcely 1 cm. wide, rather distantly toothed, the narrow triangular teeth pointed by weak spines, the upper leaves successively smaller and continuing to the heads, sessile by a clasping base, scarcely at all decurrent on the stems: heads 1.5 to 2 cm. wide and the same in height to the end of the bracts; these in about 8 series in successive lengths, 6 of the series short and fimbriate tipped, the 2 upper series lengthened and ending in scarious, usually twisted tips: flowers bright red-purple: seeds dark brown, small, 5 mm. long, 2 mm. wide.

The type specimens were collected at De Beque, Mesa county, Colorado, May 26, 1910, no *4225*. Professor Elsworth Bethel also collected it at the same place in 1909. It is quite common on the hills north of De Beque, and I think extends northward to Routt county.

The color of the flowers and the fimbriate tips of the bracts would place this species with *C. perplexans* Rydb., but the leaves are much narrower and there are more series of bracts. While this species and *C. perplexans* have fimbriate tipped bracts, suggesting relationship with *C. americanus* (Gray) Greene I do not regard them as closely related to it. They are both from the western slope and do not grow at high elevations. *C. americanus* seems to belong to timbered sections, and these to the open country.

New Windsor, Colorado.

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ANNOUNCEMENT

A new edition of the Catalog of North American Plants is in preparation. Thus far 116 pages have been printed, and other parts will follow as fast as possible. In all there will be about 300 pages. Since a considerable time must elapse before the work can be completed, the 116 pages and other parts as soon as issued, will be sent to those who wish to have them in that form, for $1.25, payment to be sent with the order.

When completed the Catalog may be had in neat green cloth binding for $1.50 postpaid. Orders for the cloth bound book may be sent in now, payment to be sent when the book is delivered.

A. A. Heller,

539 West 5th street, Reno, Nevada

Volume 7 Number 2

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FEBRUARY, 1911

Editors: A. A. HELLER and P. BEVERIDGE KENNEDY

Quercus agrifolia Nee

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University of Nevada,
Reno, Nevada

Volume 7 March 14, 1911

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THE NORTH AMERICAN LUPINES—IV

By A. A. Heller

LUPINUS CUSICKII Wats. Proc. Am. Acad. **22**: 469. 1887.

Lupinus brachypodus Piper, Bull. Torr. Club **29**: 642. 1902.

Through the kindness of Mr. Cusick I have been able to see co-types of both these species. Although the specimen of *brachypodus* is much smaller than that of *Cusickii*, a suspicious resemblance in leaf shape and in pubescence led me to carefully compare the flowers, with the result that the two were found to be identical.

Of the two descriptions, Piper's is by far the better. The two types differ principally in size, *Cusickii* being a denser, more branched plant, while the inflorescence of *brachypodus* is somewhat more elongated, one plant having it extended beyond the leaves. I have not yet had a chance to study typical *L. aridus*, and there is a possibility that both may be synonyms of that species, though the original illustration would not so indicate.

Lupinus Agardhianus

Lupinus gracilis Agardh, Syn. 15. *pl. 1. f. 2.* 1835. Not *L. gracilis* Nutt. Journ. Phila. Acad. **7**: 115. 1834.

The penciled date on the cover of my separate of Nuttall's article led me to believe that his *L. gracilis* has priority over the same name by Aghard, but in order to make no mistake I wrote to Dr. J. H. Barnhart, Librarian of the New York Botanical Garden, who kindly looked the matter up and wrote as follows:

"The part of Jour. Acad. Phila. containing Nuttall's paper (**7**: 61-115), which was vol. 7, part 1, was published in October, 1834. Agardh's Synopsis Generis Lupini was first published in the form of three theses, dated 14 December, 1835; the common form being a reissue without the thesis title-pages but also dated 1835. Nuttall's name therefore has about fourteen months priority over Agardh's."

Therefore, Watson's *L. Nuttallii*, substituted in Proc. Am. Acad. **8**: 526. 1873, for *L. gracilis* Nutt. must be displaced and Nuttall's name restored. Why Watson made the change, I do not know, except that Agardh's name was published in a monograph, and hence supposed to have a better right to be used than Nuttall's, though lacking priority.

Lupinus apodotropis

Perennial, height unknown, but probably not less than 6 or 7 dm.: lower part of stem unknown, fragment of upper portion 3.5 dm. long including the inflorescence deeply channeled, somewhat appressed pubescent with clear white hairs: petioles of basal leaves nearly 6 dm. long, pubescent and grooved like the stems; leaflets about 8, elliptical-lanceolate, 10 cm. long, 2 cm. wide, the apex acute and spinulose tipped, deep yellow green and glabrous above, somewhat appressed pubescent and paler beneath; stem leaves scattered, on successively shorter petioles, the uppermost sometimes almost sessile, their leaflets 5 cm. long, 12 mm. wide: peduncles short, 5 cm. or less: inflorescence 1.5dm. long, flowers in close whorls, violet-blue, 12 mm. long, 10 mm. deep, space between apices of banner and wings 4 mm.: bracts 11 mm. long, densely pubescent with long white hairs: pedicels purplish or brown, 6 mm. long, pubescent like the bracts: calyx densely villous, its lobes lanceolate, the upper broadly so, 5 mm. long, 3 mm. wide at base, 2-toothed, the sinus V-shaped; lower lobe 6 mm. long, 2 mm. wide at base, entire, rather narrow and convex; bractlet between the lobes 1.5 mm. long, long-villous: banner with the sides turned back and parallel, apparently almost meeting, the upper part of the face rather narrow with a deep but narrow groove, the lower part strongly concave, forming a rounded sac at base but not spurred, the whole orbicular-ovate when spread out, 1 cm. broad; wings moderately inflated, about 5 mm. across, depressed and grooved on either side above, the lower edges gradually rounded to the apex, inclosing the keel; keel glabrous, strongly curved, the purple apex slender, the base not narrowed into a stipe: pods (immature?) 2 cm. long, 6 mm. wide, densely white villous but the pods themselves dark, the whole appearing gray, 5-seeded; seeds oblong-ovoid, 4 mm. long, 3 mm. wide, dotted and mottled with brown, some spots minute, others fairly large, all irregular.

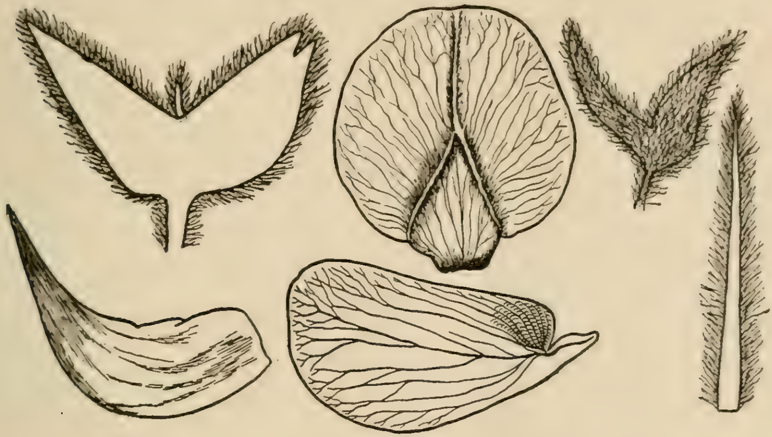

Figure 5. Floral parts of *Lupinus apodotropis*, enlarged.

The type, in the herbarium of the Nevada Agricultural Experiment Station, is *Cusick 3359a*, collected August 5, 1909, in the Wallowa mountains, on the banks of West Eagle creek, Baker county, Oregon, altitude 5200 feet. Mr. Cusick writes that it is very abundant in the Wallowa and Blue mountains of Oregon at altitudes of 5000 to 7000 feet, growing in dense, large masses on stream banks.

While averse to describing fragmentary material, the type consisting of two flowering tops, a fruiting spike and a basal leaf, I have been unable to obtain better material. This species has been referred to *L. polyphyllus*, but differs considerably. It has smaller flowers, much larger bracts, longer and acuter calyx lobes of quite different shape, a narrower flower, the banner with a deeper sac at base, and above all, in the stipeless keel, an unusual feature. Of the known species, it is probably related to *L. Burkei*.

THE COAST LIVE OAK

By A. A. Heller

QUERCUS AGRIFOLIA Nee, Anales de Ciencias Naturales **3:** 271. 1801.

This beautiful evergreen oak, characteristic of the coast hills and valleys in the bay region of California, was first collected at Monterey in September, 1791, by Thaddeus Haenke, one of the botanists of the Malaspina expedition, planned by Charles III. of Spain, and sent out by his successor, Charles IV. on a voyage of discovery and scientific exploration of the distant possessions of the Spanish kingdom.

Haenke was not only the first botanist to visit California, but *Quercus agrifolia* was the first Californian tree described and published by a botanist. But it had been previously mentioned in what might be termed a "popular" way by several persons. The earliest of these was Father Venegaz, in his Natural and Civil History of California **1:** 46. 1758. He referred to it as "holm," a word denoting an evergreen tree with prickly foliage.

Vancouver, who visited California in 1792, noted on or near the site of San Francisco, "small bushy holly-leaved oaks," and in the valley about the Mission of Santa Clara "the holly-leaved oaks were increased from dwarf shrubs to trees of considerable size." While at Santa Barbara in the fall of 1793 he "procured some stout knees from the holly-leaved oak, for the security of the Discovery's head and bumkins." His journal, containing these extracts, was published in 1798.

The accompanying illustration was taken in the type region on the Carmel valley slope of the road leading from Monterey to Carmel Mission, and shows the characteristic growth of a mature tree grown in the open. The following is taken from Sudworth's Forest Trees of the Pacific Slope:

"It has a short, clear trunk and a narrow or very broad, dome-shaped, dense crown, according to whether it is crowded or in the open. It usually grows in the open. Occasionally it is only a low, shrubby tree. It is ordinarily from 25 to 50 feet in height and from 1 to 2 feet in diameter. Very old trees in the open are from 60 to 75 feet high and from 3 to 3½ feet through. Very long, thick, crooked limbs are given off from the short, clear trunk (which is often only from 4 to 8 feet long), forming with numerous fine twigs a dense, exceedingly broad crown, sometimes reaching the ground; trees in crowded stands have rather slender branches. Small trees and the large limbs of big trees have smooth, light grayish-brown bark, with frequent ashy-white areas, while large trees have very thick, hard, blackish or very dark brown, roughly furrowed bark, with wide ridges. Season's twigs, dull gray to reddish brown, with pale chestnut-colored buds, are somewhat downy, with very short, whitish hairs.

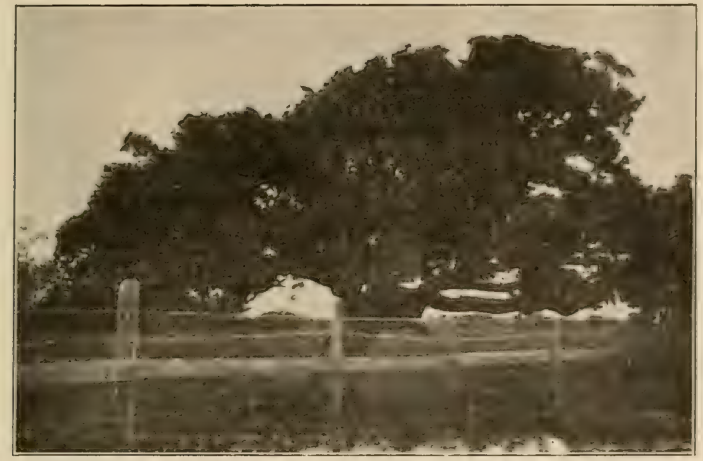

Figure 6. Quercus agrifolia Nee

"Mature leaves are more or less conspicuously curled on their prickly-toothed or entire edges and are usually dark (but often light) shiny green on their convex upper sides—sometimes coated with light colored minute, star-shaped hairs, while beneath they are paler green, smooth, somewhat shiny, and with brownish hairs in the angles of the veins, or, again, the entire under surface is downy with minute, dense hairs. The leaves are thinnish, but peculiarly stiff and brittle. The foliage appears to be evergreen, but remains on the trees only until the succeeding spring, usually beginning to fall before or a short time after the new leaves are formed. Flowers appear mainly in early spring, the acorns maturing in the autumn of that season; occasional trees produce flowers in the fall and small immature acorns which drop from the trees by spring. The cups of acorns are peculiar in having their scaly edges turned in. Wood brittle, hard, heavy, exceedingly fine-grained, reddish brown; sapwood very thick and darker than heart. It has economic value only for fuel, since the tree has a very poor timber form and the wood checks and warps badly in seasoning. Bark of this species is extensively used to adulterate the similar but much more valuable tanbark obtained from the California tanbark oak."

It ranges from Mendocino county south to northern Lower California in the coast region, occurring on "low hills and open valleys, slopes of higher foothills, shallow canyons, in dry loamy or gravelly soils; also (but stunted) on exposed seashore." While not positive, I think it is found on the summit of Mt. Hamilton, Santa Clara county, at an altitude of 4200 feet. Sudworth records it from such an altitude only in the extreme southern part of its range. It is also found on all of the islands off the coast of southern California. Roughly, it occurs mainly within the fog belt, but Sudworth says the climatic conditions are similar to those for Monterey pine. This is not altogether correct. The Monterey pine is subject to almost daily fogs in summer, which is not the case in much of the range of this oak. The average annual precipitation for the pine is given as seventeen inches. In Mendocino county it is probably forty inches, but the oak is not common there. At Los Gatos, Santa Clara county, where it is common, the average rainfall is thirty-one inches, and a few miles farther back in the mountains is not less than forty inches.

One might infer from the sentence describing the falling of the old leaves that they drop rapidly as do those of the ordinary deciduous trees. This is not the case, for at no time does the tree show any apparent diminution of the mature foliage, being perpetually clothed with a dense glossy coat of green, with the added bright tints of the unfolding leaves in spring.

CAKILE CALIFORNICA

The genus *Cakile* seems to be a southern one, and this species strictly maritime. From the description it appears to be near *C. maritima* Chapman, and indeed may be synonymous. *C. californica* has been collected on the northwest coast at the following stations:

Near Port Angeles, Wash., by Webster, 1908, *fide* J. B. Flett; near Pacific Beach, Wash., 1908, 1910, by A. S. Foster; near Long Beach, Wash., 1907, by students of Stanford University, *fide* Muhlenbergia; near Tillamook Head, Oregon, *fide* M. W. Gorman. These stations are probably about the northern limit of distribution. The writer will mail a specimen to the first applicant.—A. S. FOSTER, *Pacific Beach*, *Wash.*

HARTWEG'S EXPLORATIONS IN CALIFORNIA—I

By Alice Eastwood

While looking up types of Californian plants at the Gray Herbarium, I became aware of the great number of specimens collected by Hartweg contained therein. About the same time I happened upon a reference that led me to Hartweg's Journal, published in the Journal of the Horticultural Society, 1846-48. The earlier part of this refers to travels in Mexico, and is of little interest to Californian botanists; but the part that narrates his travels and collections in California are not only interesting, but also give us knowledge of where he collected and the approximate localities where his types were obtained. While I had the opportunity I sought in the Gray Herbarium all the specimens numbered, described and named in Bentham's Plantae Hartwegianae, so as to see whether later botanists had made any changes. The following reprint of the Journal and list may be of value, since so far as in my power it gives the results of latest determinations.

I have been able to learn very little about Theodor Hartweg. He was a German botanist sent first to Mexico in 1836 by the Horticultural Society, and later in 1846 and 1847 visiting and collecting in California. The beginning of the part of his narrative which concerns us is found on page 122 of volume 2 of the Journal of the Horticultural Society, received November 4, 1846:

"On the 14th of March, I finally left Tepic for San Blas, whither my luggage had preceded me, and embarked the following day on board of a small schooner for Mazatlan where I arrived after a passage of five days. Mazatlan is now the most important port on the west coast of Mexico, as the customhouse officers are more accommodating than at San Blas or Acapulco.

Upon making inquiries about merchant vessels proceeding soon to Northern California, I found to my consternation that no opportunity had offered for the last six months, nor was it likely there would be any for some time; but that the United States ship 'Portsmouth' would sail in a few days for Monterey.

The day previous to her sailing I applied to Commodore Stoat for a passage backed by a letter of introduction from an influential house in Mazatlan, but I was told by him in a very few words that he could not serve me; that under the present circumstances, when a rupture between the United States and Mexico was hourly expected, he could not let his movements be known; thus wishing to keep the 'Portsmouth's' destination secret—her purpose being well known three weeks before she sailed.

"More successful was an application I made about the beginning of May to Rear-Admiral Sir George Seymour of H. M. S. 'Collingwood,' who kindly allowed me a passage on H. M. S. 'Juno' then proceeding to Monterey. Towards evening of the 11th of May, I went on board, and, sailing the following morning, we arrived at Monterey on Sunday the 7th of June, after a passage of twenty-six days.

"On the 8th I delivered my letters of introduction, and the following morning I settled down in the quiet little town of Monterey.

"The verdant fields and pine-covered range of mountains at the back of the town form a pleasing contrast to the dried-up vegetation about Mazatlan. The predominating tree is an evergreen oak (Quercus Californica (**1**), forming a tree 30 feet high, with a globular crown,and having the branches much distorted. It occurs principally in low but dry situations. The higher parts are occupied by Pinus insignis, a tree 60 to 100 feet high, with a stem 2 to 4 feet in diameter. This species is liable to vary much in the size of the leaves (which stand in threes) and in the cones (according to local circumstances). In close woods a mile or two from the sea-shore, at an elevation of 200 to 300 feet, the leaves usually measure 4½ to 5½ inches, and cones 4 to 4½ inches in length by 2½ broad; toward the beach where the trees are mostly one-sided—a defect caused by north-west winds, which blow for the greater part of the year—both leaves and cones diminish in size.

(**1**) QUERCUS AGRIFOLIA.

"These differences, which are too insignificant to establish even varieties of Pinus insignis, have given rise to the names Pinus tuberculata and radiata, which were according to Loudon, collected by the late Dr. Coulter near the sea-shore at Monterey; that locality, no doubt, is Point Pinos, as it is the only habitat near Monterey where pines grow close to the beach; it is at the same time the place where I made the foregoing observations. In all situations the cones grow three or four together in a cluster, remaining on the trees several years after shedding the seeds; are pendulous, with the apex somewhat recurved; deformed, that is, the scales on one side are more developed than on the other, and enclose two winged seeds under each scale. The cones are about eighteen to twenty-four months in ripening.

"On the dry banks of ravines to the north east of the town, the Californian horse-chestnut (Pavia Californica) is common. This extremely ornamental shrub or low tree rises to the height of 25 feet, is of a globular shape, and produces its fragrant white flowers of a delicate pink hue in great abundance on spikes 12 inches long; one of these spikes, which I had the curiosity to count, had more than 400 open flowers and buds upon it. Of shrubs I observed Ceanothus thyrsiflorus very common in the pine woods, and forming an evergreen shrub 10 to 15 feet high; Sambucus No. 28 (**1**); Lonicera racemosa (**2**); Spiraea ariaefolia; Rhus 3 sp. (**3**); Caprifolium Douglasii, No. 4 (**4**); Diplacus No. 65 (**5**); Garrya elliptica; Rosa No. 12 (**6**); Lupinus arboreus and ornatus; Ribes speciosum and malvaceum; Adenostoma fasciculatum, a neat little evergreen shrub allied to Spiraea; Arctostaphylos 3 sp.; a Vaccinium; Gaultheria Shallon;

(**1**) SAMBUCUS GLAUCA Nutt.

(**2**) Perhaps LONICERA INTERRUPTA 41.

(**3**) Probably all forms of RHUS DIVERSILOBA T. & G.

(**4**) SYMPHORICARPOS MOLLIS Nutt.

(**5**) DIPLACUS GLUTINOSUS (Wendl.) Nutt.

(**6**) R. cinnamomea L. var. pedunculis solitariis geminibus. ROSA PINETORUM Heller, or R. CALIFORNICA GLANDULOSA Crepin.

and an evergreen Prunus, No. 102 (**1**), resembling the Portugal Laurel. Of annual and perennials, No. 13; Hugelia, No. 5 (**2**); Delphinium 3 sp. No. 24, 26, 61 (**3**); Leptosiphon androsaceus and densiflorus; Collinsia bicolor; Convolvulus No. 23 (**4**); Malva No. 25 (**5**); Lupinus succulentus and densiflorus; Castilleja No. 39 (**6**); Oenothera No. 3, 44 (**7**); Chironia No. 39 (**8**). Of bulbs Calochortus luteus, Cyclobothrya alba, Brodiaea congesta, Calliprora flava, Hesperocordum lacteum, and a Zygadenus called Amole, of which the bruised roots serve as a substitute for soap.

"On June 22nd I left Monterey for the mission of Santa Cruz, in company with an American gentleman, who obligingly furnished me with a horse for the occasion. Santa Cruz is across the bay, due north, of Monterey, and at a distance of sixty miles by land, whilst by water it does not exceed twenty-five miles. Passing along the sea-shore over the plains, which present the same vegetation as about Monterey, we arrived in the afternoon at the mission, after a gallop of seven hours. This speed is the usual mode of Californian travelling; on longer journeys some horses are driven before, to serve on the following days.

"The mountains of Santa Cruz are well wooded with Taxodium sempervirens, called by the American settlers redwood or bastard cedar. In close forests it grows to an enormous size, averaging 200 feet in height, with a stem of 6 to 8 feet in diameter, which is as straight as an arrow, and clear of branches up to 60 or 70 feet. One tree that is termed by the Americans 'the giant of the forest,' is 270 feet high, with a stem measuring 55

(**1**) PHOTINIA ARBUTIFOLIA.

(**2**) NAVARRETIA ATRACTYLOIDES H. & A.

(**3**) 26. D. SIMPLEX. 24. D. DECORUM. 61. D. CALIFORNICUM.

(**4**) CONVOLVULUS CALIFORNICUS Chois.

(**5**) SIDALCEA MALVAEFLORA.

(**6**) C. FOLIOLOSA.

(**7**) No. 3, GODETIA RUBICUNDA; No. 44, G. PURPUREA.

(**8**) ERYTHRAEA MUHLENBERGII Griseb.

feet in circumference at 6 feet from the ground. The bark of the redwood is from 6 to 12 inches thick, reddish and smooth the timber is of a beautiful red color, like pencil-wood, fine, close-grained, light but brittle; it is well adapted for in and out door work, as the boards when seasoned do not warp, nor is it attacked by insects. Large quantities of lumber are annually exported to the Sandwich Islands; 1000 feet of 1-inch boards, delivered on the beach at Santa Cruz, are worth 8 pounds.

"Some fine trees of Abies Douglasii are found in the mountains of Santa Cruz; they do not form masses of themselves, but are thinly scattered among the redwood trees, with which they vie in size. The mountain oak No. 84 (**1**), (Castanea chrysophylla?) also occurs here, forming a tree fifty feet high, of a pyramidal shape, with persistent lanceolate leaves four inches long, serrulate on the margins; below they are covered with a rusty yellowish down, which in the young leaves, also covers the upper surface. The fructiferous catkins are produced on the points of last year's wood, and do not exceed 2 inches in length, whilst the catkins on the young wood are from 4 to 5 inches long, and sterile. The nuts or rather acorns, are covered in an unripe state, with down, and enclosed in an open cup, which on the outside is clothed with coarse scaly hairs. The mountain oak grows invariably in close shaded woods, and seems to be widely dispersed over the country west of the Rocky mountains. Some Indian tribes eat the acorns either raw, or make a sort of bread of them.

"On the outskirts of the woods I observed Arbutus procera 50 feet high; a Lauraceous tree with linear light green leaves of nearly the same dimensions; two species of Ceanothus; Corylus No. 85; a Spiraea; Solanum No. 90 (**2**); Zauschneria No. 97 (**3**) with scarlet flowers like a Fuchsia, and No. 87 (**4**).

(**1**) QUERCUS DENSIFLORA H. & A.
(**2**) SOLANUM UMBELLIFERUM Esch.
(**3**) ZAUSCHNERIA CALIFORNICA Presl.
(**4**) ANTIRRHINUM GLANDULOSUM Lindl. Corolla rosea.

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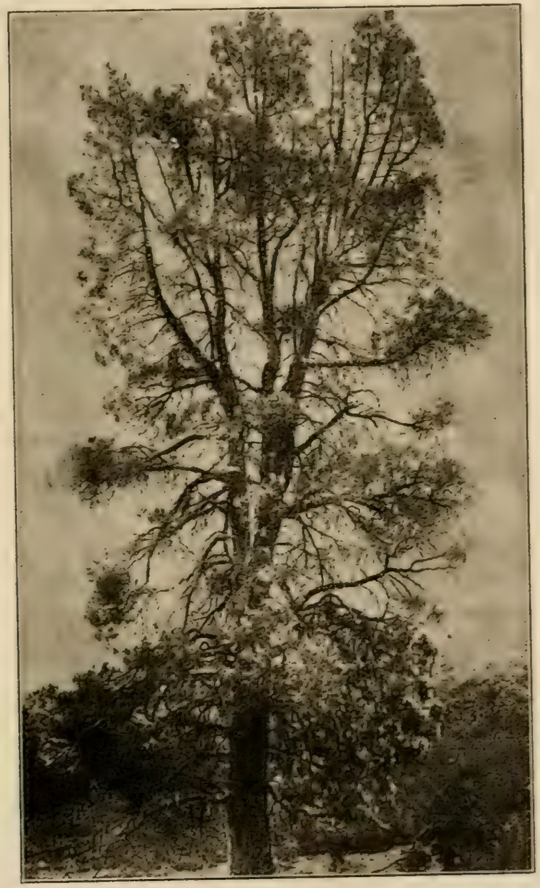

Pinus Sabiniana Dougl.

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University of Nevada,
Reno, Nevada

Volume 7 March 31, 1911

MUHLENBERGIA

HARTWEG'S EXPLORATIONS IN CALIFORNIA—II

BY ALICE EASTWOOD

[From Journ. Hort. Soc. **3:** 217. 1848.]

"XXIII. Journal of a Mission to California in Search of Plants. By Mr. Theodor Hartweg in the service of the Horticultural Society. Part IV., continued from Vol. II., p. 191.

"Received June 6, 1848.

"With January the rains set in unusually severe; the Salinas and other rivers, which are fordable during ordinary seasons, have now become impassable.

"The first indications of returning spring I observed in the flowering of Garrya elliptica, Berberis aquifolium (**1**), Ribes speciosum, R. malvaceum, Arctostaphylos, Nos. 158, 159, and 160; Vaccinium No. 157, a dwarf shrubby Prunus (No. 162), with white pendulous flowers, and Ornithogalum No. 163.

"When the weather permitted it, I continued my rambles on foot in the mountains of Monterey, and discovered on the western declivity, within two miles of the seashore, a species of Pine which I had not found previously. The leaves are two in

(**1**) BERBERIS PINNATA Lag.

158. ARCTOSTAPHYLOS TOMENTOSA Dougl.

159. A. TOMENTOSA var. HIRSUTA

160. XEROBOTRYS VENULOSA Nutt. Trans. Am. Phil. Soc. **8:** 262. *Arctostaphylos Hookeri* Don.

157 VACCINIUM OVATUM Pursh.

162. NUTTALLIA CERASIFORMIS T. & G.

163. ANTICLEA FREMONTII var. MINOR H. & A.

a sheath, three to five inches long; cones in clusters of four to seven, oval, three inches long by two broad, of a reddish brown before they are perfectly ripe; scales pyramidal, terminating in an ash-green sharp point. The trees attain no great elevation, averaging twenty feet, rarely thirty, with a stem of twelve inches in diameter; they are confined to half a square mile and like P. insignis, by which they are surrounded on all sides, thrive in coarsely decomposed granite. This species, which appears to be new, I have named, in compliment to Thomas Edgar, Esq., the Society's Treasurer, Pinus Edgariana.

"In the same locality with the above Pine, I observed a Cypress (Cupressus, No. 166) with smaller cones than C. macrocarpa, of which it seems more than a variety, being a stunted shrub six to ten feet high.

"Returning by a different route, through a thick brushwood of Arctostaphylos and Ceanothus, I found on the steep acclivity, in a shaded dell, a Rhododendron, without seeds or flowers, forming a shrub five feet high, well beset with flower-buds, and Castanea chrysophylla (1) in the same condition; this evergreen Chestnut forms a shrub three to eight feet high, of a pyramidal shape, with persistent lanceolate leaves, green above, and of a rich golden yellow below. From its situation, and habit in general, it may be expected, if I am fortunate enough to introduce it, to withstand the ordinary winters about the neighborhood of London, since it is known from experience that Ceanothus thyrsiflorus with which it grows is of that degree of hardiness.

In February, Dodecatheon, No. 170, appeared everywhere common, as also Fragaria vesca, Cardamine, No. 174, No. 17, Viola 176, Saxifraga, 178, Trillium, 182, T. 183; of shrubs two

(1) CASTANOPSIS SEMPERVIRENS (Kellogg) Dudley

166. CUPRESSUS GOVENIANA Gord.

170. Two forms were collected, one with lilac flowers, D. HENDERSONII, and the other with white flowers, probably D. ELLIPTICUM.

174. C. PAUCISECTA Benth. sp. nov.

176. V. LONGIPES Nutt.

178. S. CALIFORNICA Greene.

182. T. GIGANTEUM (H. & A.) Heller. T. OVATUM Pursh.

species of Ceanothus, the one producing numerous bundles of blue flowers from the axils of its small evergreen leaves, the other C. thyrsiflorus, often attaining the size of a small tree, sending forth its numerous heads of azure flowers from last year's wood. In the sandy plains towards the river Salinas, the large golden-flowered Viola chrysantha, Nemophila insignis, Eschscholtzia crocea, and Eschscholtzia californica were common.

"My sojourn in California being restricted according to my instructions to one year, whilst a similar period is to be devoted to visiting the northern provinces of Mexico, or in case I find this country a favorable field for my exertions, permission having been granted until I receive orders to the contrary, that I may stay the whole term of two years in California, I resolved in the absence of new instructions from the Council of the Society, not to proceed to northern Mexico, where during the war with the United States, my peaceful occupation might be disturbed, and my personal safety endangered, but to remain another season in California, more especially as, from my late arrival in this country, and subsequent circumstances, I could not extend my excursions as I intended to have done. The next step to be considered is, whither can I proceed to follow my occupation with satisfaction to my employers and myself? This country has been taken possession of last year by an American force, much against the good will of the Californians. Now, although the country is apparently quiet, it is difficult to fortell how long it may last, and if these disturbances should break out again during my busy season, it might seriously affect my plans. I therefore came to the conclusion of visiting the Sacramento Valley, where the settlers are all foreigners, and where I need not be under any apprehensions of disturbances in the lower country.

"Accordingly I embarked on the 8th of March on board the American bark Tasso, and arrived at Yerba Buena after a passage of five days. A few days' detention enabled me to examine the neighborhood, and added to my collections, among other less interesting plants, a white Myosotis No. 190, Liliaceae, No. 192, Oenothera No. 194, a scarlet Aquilegia No. 198, Iris No. 204, and Ribes echinatum (**1**), the latter common in the sand hills that surround the town.

"On March the 23d I embarked in a small launch with Mr. Cordua, who was proceeding to his farm in the Sacramento Valley, and who kindly invited me to make his house my headquarters; an invitation which I gladly accepted, as from his long residence in the country, and the situation of his farm, in the centre of the valley, I anticipated many happy results. Late in the afternoon of the following day we arrived at the Corte de Madera, which, as the name implies, is a wood-cutting establishment, where Mr. Cordua had some business to transact. Half an hour's ramble in a fine grove of redwood trees furnished me a brown, small flowering Martagon No. 218, Boraginea No. 217, and Equisetum No. 219. The same night we left again, and passing the following morning through the straits of Carquinez into Suisun Bay, we entered the river Sacramento in the afternoon. The aspect of the country is flat, presenting a boundless field of rushes as far as the eye can reach, bordered on both sides by a distant ridge of mountains, which from the severity of last winter, presented a line of snow. The lowlands of the Sacramento are subject to inundations during the spring months, and are destitute of trees, with the exception of the banks, which from the accumulation of soil during the inundations are higher than the rushlands; a belt of trees and shrubs, varying from thirty to two hundred yards in depth, extends along the banks,

(**1**) Ribes occidentale H. & A.
190 Allocarya Chorisiana (C. & S.) Greene
192 Muilla maritima Wats.
194 Oenothera ovata Nutt.
198 Aquilegia truncata F. & M.
204 Iris longipetala Herb.
218 Fritillaria lanceolata Pursh.
217 Cynoglossum grande Dougl.
219 Equisetum fluviatile L.

and is chiefly composed of Oaks, Platanus, Willows, Poplars, Ash, Negundo Californicum, Pavia Californica, Cornus, a dwarf Birch, and a Grape-vine.

"After a tedious process of warping up the launch against a strong current, we arrived at the landing-place of Fort Sacramento, on the 31st of March. An ineffectual attempt at doubling a point against a strong head wind, during which we narrowly escaped being capsized, determined Mr. Cordua to leave the launch and proceed by land; we accordingly disembarked at the mouth of the American Fork, and following that stream about six miles, we arrived at Mr. S's. Having procured horses the following morning, after a day and a half's ride we reached Mr. Cordua's farm, situate on the left bank of the Sacramento at the junction of the Chuba [Yuba] with the Feather river, which twenty miles below falls into the Sacramento.

"On April the 13th I left with Mr. L. for his farm, seventy miles higher up in the valley. Mr. L. had been in the lower country, and came up thus far with his goods in a large canoe, and was now proceeding with them in waggons. Crossing Feather river, which here is eighty yards broad, and of a considerable depth, our course lay five and twenty miles along that river, through a beautiful wood of evergreen and deciduous oaks: here I found in sandy tracts, Leptosiphon No. 232, with white fragrant flowers; Collinsia, No. 238; C. bicolor, the latter invariably growing at the foot of large oaks.

Leaving Feather river, we struck across the prairie for twenty miles: here immense fields of Eschscholtzia crocea, E. Californica, and Ranunculus, no 239, presented themselves, each species growing by itself, which with the plants observed on Mr. Cordua's farm, and Lupinus nanus, Delphinium No. 205, No. 236, Trifolium No. 237, Compositae Nos. 241, 242, 243,

232 GILIA DICHOTOMA Benth.
238 COLLINSIA BARTSIAEFOLIA Benth.
239 RANUNCULUS CANUS Benth.
237 TRIFOLIUM ALBOPURPUREUM T. & G.
241 LAGOPHYLLA DICHOTOMA Benth.
242 ACHYRACHAENA MOLLIS Schauer.
243 CHAENACTIS HETEROCARPHA Gray

Oenothera 244, Malvaceae No. 246, produced a splendid effect. A small patch of the beautiful little Leptosiphon aureus, with golden flowers, I also found in the open prairie; it is however, by no means common.

"The prairies of the Sacramento valley are divided by small rivers, termed "creeks" by tho American settlers: these creeks generally have a border of oaks upon their banks, which also extend over the rich bottom lands. In the dry beds of these rivers I observed plants which nowhere are to be found upon the prairie, the seeds of which have evidently been carried down from the mountains during the rains, as for example, Pentstemon azureum, No. 255, P. No. 213, Umbellifera No. 257, with an aromatic tap-root, held in repute among the Indians, for its medicinal properties; in rather damp places, Clintonia elegans, C. pulchella (**1**), and Limnanthes alba, No. 315.

"A four days slow drive with the waggons brought us to the farm of my companion: the vegetation here differed in no respect from that already observed in the valley.

"An opportunity of visiting the mountains was afforded me a few days after my arrival, which I embraced with pleasure, as from the hostile character of the mountain Indians towards the settlers, it was not deemed prudent for me to make an excursion in that direction, attended by a guide only; I therefore joined a party of settlers who were going to the mountains to examine the timber, and if possible to find a site for a sawmill.

"On the first evening we encamped under a large oak, near Pine creek, a little mountain rivulet; here I found Asagraea No. 273, Lychnis No. 286, Umbellifera No. 302, Triteleia No. 301,

(**1**) The genus now known as *Downingia* or *Bolelia*.
244 OENOTHERA GRACILIFLORA H. & A.
246 SIDALCEA HARTWEGI Gray
255 PENTSTEMON HETEROPHYLLUS Lindl.
313 PENTSTEMON AZUREUS Benth.
257 PEUCEDANUM TOMENTOSUM Benth.
286 SILENE CALIFORNICA Durand.
301 DICHELOSTEMMA VOLUBILIS (Kellogg) Heller

with a head of pink flowers supported on a twining stem, five feet long; in the creek Saxifraga, No. 296; of shrubs and trees, Ceanothus No. 285, evergreen and deciduous oaks, and Pinus Sabiniana. This species of Pine, of which I saw some small trees near Monterey last year, rises here to the height of fifty or sixty feet, with a stem of six feet in circumference, and possesses none of the regularity so characteristic of the Pine tribe. The branches, which in other pines stand in whorls, are in this species quite irregular (except when young), which, combined with the paucity of its partly bent down, glaucous leaves, gives the tree a peculiar appearance.

"Early the following morning we ascended the gradual acclivity, and passed through a brushwood entirely composed of Ceanothus, No. 285. At noon we arrived at the edge of a noble Pine forest; a few moments rest, during which one of our companions shot a deer, enabled me to collect Viola No. 287, Erythronium No. 288, Prunus No. 289, Lilium No. 294, Cyclobothra No. 295. The species of Pine composing the forest is principally Pinus Benthamiana, with a few trees of P. Lambertiana, Abies nobilis, and a species of Thuja intermixed, No. 309, Ceanothus no 284, spreading on the ground, and Cornus florida No. 297, were the only plants observed in the pine woods.

"On our return, through a steep ravine, I found a shrubby Cercis, No. 282, with pink flowers; Prunus No. 283, and again Cyclobothra No. 295.

296 Peltiphyllum peltatum (Torr.) Engler.
285 Ceanothus cuneatus (Hook.) Nutt.
287 Viola lobata Benth.
288 Erythronium Hartwegi Wats.
289 Prunus demissa (Nutt.) Walp.
294 Fritillaria recurva Benth.
295 Cyclobothra pulchella
709 Cycladenia humilis Benth.
284 Ceanothus prostratus Benth.
297 Cornus Nuttallii Audubon.

"By the end of April the prairies in the Sacramento valley assumed a different aspect; two weeks ago they were a carpet of flowers, which have now disappeared, and a yellow, sickly tinge pervades the whole: such is the rapidity of vegetation under the cloudless sky of a tropical sun. Bulbous plants now make their appearance; the most common being Triteleia laxa, which not only grows in the open prairie, but also in the shaded and damp lowlands; a pure white variety of it I also found: it is, however, by no means common. Calochortus No. 306, is also very frequent; a whitish variety occurs occasionally along with Brodiaea congesta, B. No. 274, B. No. 326, Liliacea No. 250, and Liliacea No. 300.

"Being now aware of the rapidity of Californian vegetation, I lost no time in collecting such seeds as were worth taking, and returned to my headquarters by the beginning of May. Most kinds had, during the fortnight I first saw them in flower, ripened their seed, and it was with difficulty I found a few grains of the beautiful little Leptosiphon aureus, and similar plants, which, between their taller neighbors, had almost become invisible."

306 CALOCHORTUS VENUSTUS and C. LUTEUS.
274 DICHELOSTEMMA MULTIFLORUM (Benth.) Heller.
326 HOOKERA CALIFORNICA (Lindl.) Greene
250 HESPEROCORDUM LACTEUM Lindl.

THE GRAY PINE

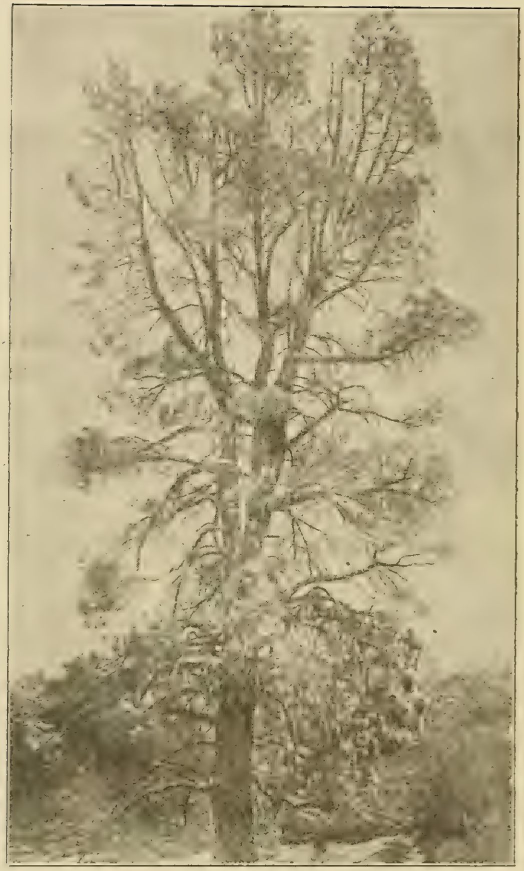
By A. A. Heller

PINUS SABINIANA Dougl. Trans. Linn. Soc. **16**: 747. 1833.

The following account of this species is given by Sudworth in Forest Trees of the Pacific Slope:

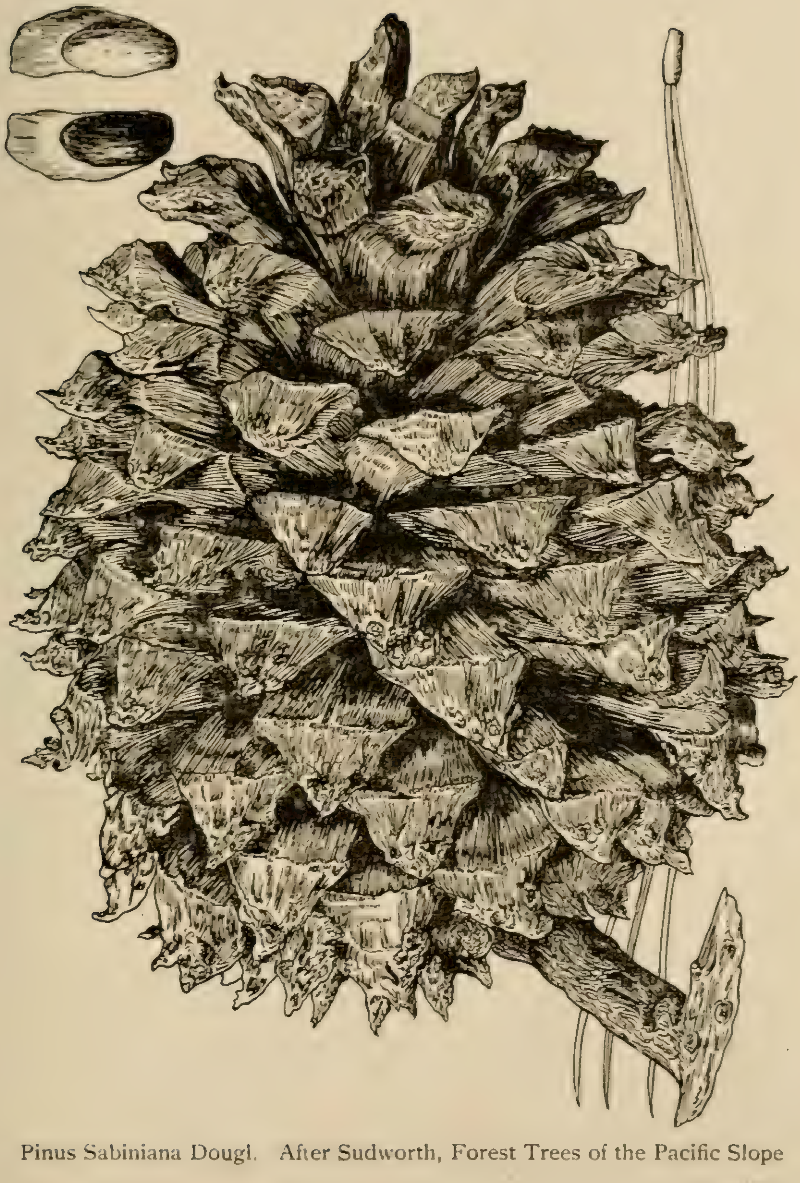
"Gray or Digger pine owes its common names to the pale blue-green color of the foliage and to the fact that the large seeds furnish an important food to the California Digger Indians. Its gray, thin-foliaged crown of one or two long upright forks with lower drooping small branches distinguish it at long distances from associated trees. The meager foliage permits the big, dark cones to be seen half a mile away. Young trees form a rounded or pyramidal crown of upright branches from a short, thick stem. In middle age two or more of the upper branches grow very large and long, forming conspicuous U-shaped forks. Old trees are from 50 to 75 feet high, with a bent or rarely straight trunk from 20 to 30 feet long and from 18 to 30 inches in diameter. Larger trees are sometimes found. The bark of young trees and of branches is a dull gray; that of mature trunks is about 2 inches thick and very roughly furrowed and ridged. The ridges are scaly, wide, irregularly connected, and of a dark gray-brown, tinged with purple-red in unweathered parts. The thin, drooping clusters of leaves, a light blue or gray-green, occur two in a bundle, and are from 8½ to about 12 inches long. Those of a year's growth remain on the tree for three or four years. When the tree is planted for ornament in a rich, irrigated soil, within its natural range, the foliage becomes very much stouter, giving the tree an entirely different aspect from one grown in its dry native habitat; the cones of such cultivated trees are usually smaller. With the exception of the Coulter pine, the gray pine produces the largest and heaviest cones of any American pine. They mature by September of the second season, remaining firmly attached to the branches for a number of years. The cone scales open very slowly, so that seeds continue to be shed for several months. Indians hasten the opening of the cones by placing them in a small fire. Cones are from 6½ to 10½ inches

Plate 3



Pinus Sabiniana Dougl.

Plate 4



Pinus Sabiniana Dougl. After Sudworth, Forest Trees of the Pacific Slope long. The tips of the scales are a reddish or chestnut brown, later weathered and grayish brown. The seeds and short wings are very dark chocolate or blackish brown. Seed leaves commonly 15, but often 16. Wood, very coarse-grained (the result of scattered or open stands), dark yellowish brown, often tinged with red; locally used for fuel.

"Little is definitely known of the longevity of this pine. It appears to attain its average full growth in from 60 to 80 years; trees from 20 to 24 inches in diameter are from 40 to 50 years old. Recurring fires, to which it has been subjected, seem to prevent its longer survival. If permitted, it would probably not attain an age of over 150 years except in a broken and decrepit form."

This species is restricted to California occurring from the northern part of the state in Humboldt and Shasta counties to the mountains bordering the Mohave desert in Los Angeles county, but is not found on the westward slope of the outer Coast Range adjacent to the ocean. It prefers the hot and dry slopes of the interior valleys where the rainfall is comparatively scanty, although in places in the western part of its range it is found within the fog belt, as about Alum Rock Park near San Jose. Roughly, a chart of its distribution would include the foothills and lower ridges surrounding the great interior valley, where it occurs singly or in small groups, never forming forests, up to an altitude of 4000 feet or more on some of the peaks of the inner Coast Range. Seedlings come up and grow rapidly under chaparral, but apparently need little or no shade. Since the seeds are large and heavy, they are not usually carried any considerable distance by the wind.

According to Jepson (Fl. Cal. **1:** 41), Douglas discovered this tree "probably near San Juan Bautista," a mission situated on the hills between Gilroy and Pajaro, and named it after his friend, Captain Joseph Sabine, then secretary of the Horticultural Society.

The cones are, as originally described, "during the first year rounded and bright green, when perfected the following November, elongated and brown."

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ANNOUNCEMENT

A new edition of the Catalog of North American Plants is in preparation. Thus far 116 pages have been printed, and other parts will follow as fast as possible. In all there will be about 300 pages. Since a considerable time must elapse before the work can be completed, the 116 pages and other parts as soon as issued, will be sent to those who wish to have them in that form, for $1.25, payment to be sent with the order.

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Volume 7 Number 4

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APRIL, 1911

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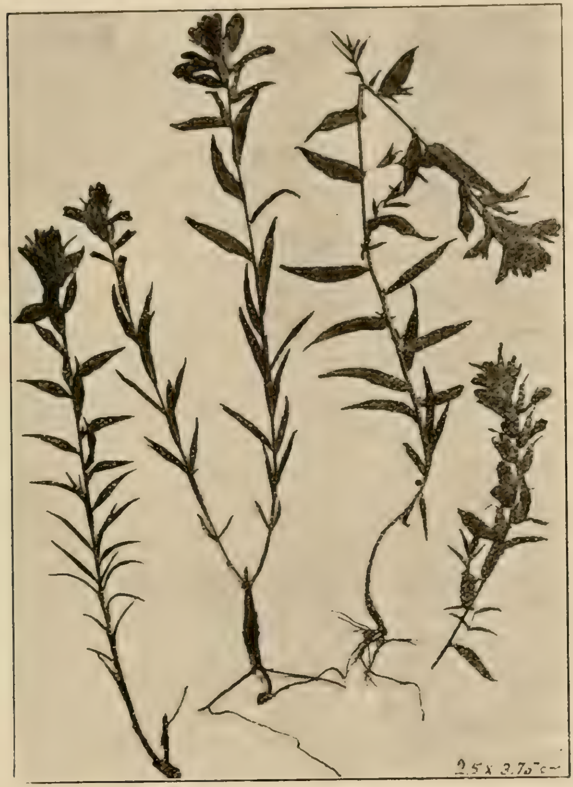

Castilleja austromontana Standley and Blumer

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University of Nevada,
Reno, Nevada

Volume 7 April 27, 1911

MUHLENBERGIA

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NEW YO
BOTANIC
GARDE

HARTWEG'S EXPLORATIONS IN CALIFORNIA—III

By Alice Eastwood

"An excursion to the "Butes," on isolated group of mountains between the Sacramento and Feather rivers, furnished me with Campanulacea No. 316, C. No. 317, Scrophularinea No. 318, Compositae Nos. 319 and 320, Gilia No. 324, G. 335, Linum 325, Trifolium No. 331, Labiatae No. 333, Asclepias No. 338, and Umbellifera No. 339, called Yerba de la vivora, the leaves and stem of which are universally used with success against the bite of rattlesnakes.

"From the rocky summit of the Butes a beautiful view is obtained of the Sacramento valley; during the time of my visit, the lower country, owing to the melting of the snow in the mountains and consequent inundations, presented an immense lake.

"Another excursion I made to the mountains led along the right bank of the Chuba [Yuba] river, over the now parched

316 Githopsis calycina var. hirsuta.
317 Githopsis calycina Benth.
318. Orthocarpus lacerus Benth.
319 Orthocarpus bicolor Heller
320 Wyethia helenioides Nutt.
324 Navarretia cotulaefolia Hook.
335 Navarretia pubescens H. & A. Blue corolla.
325 Linum californicum Benth.
331 Trifolium fucatum Lindl.
333 Pogogyne multiflora Benth.
338 Gomphocarpus cordifolius Benth.
339 Daucus pusillus Michx.

MAY 4 — 1911

up prairie. A ride of fifteen miles brought me to the foot of the mountains. The lower range, as in the former visit higher up in the valley, is occupied by Ceanothus No. 285, a few live Oaks, and Pinus Sabiniana. Following a small rivulet, I found there Mentha No. 348, Labiata No. 352, Stenactis no 353, a shrubby Labiata, no. 355, with large white flowers, and Collinsia tinctoria, No. 354. This new species of Collinsia is of stronger growth, though less striking, than C. bicolor; it grows chiefly in the dry sandy bed or on the banks of the rivulet, and produces its yellowish flowers mottled with purple much later than C. bicolor. On a subsequent occasion, when I returned to this place, to procure seeds or it, my hands were stained yellow by the glandular hairs which cover the seedpods, from which circumstance I named it Collinsia tinctoria.

"Another interesting plant I found on this excursion is Nemophila speciosa with white petals, one-third of which is tipped with purple. It grows generally near rivulets, or in damp and partly shaded places. If the few seeds I procured should vegetate, it will prove a gieat acquisition to that handsome genus.

"The higher part of this range of mountains is less accessible than on the former visit. My endeavors to proceed farther were eventually frustrated by the steep banks and swollen state of the Chuba.

"By the beginning of June I set out again, in company with Mr. Cordua and an Indian, to visit if possible the snowy heights of the mountains, generally termed by emigrants from the United States the Californian mountains. After crossing the Chuba river we struck across the prairie, and entered the mountains near Bear Creek, where we encamped towards evening in a grove of Pinus Sabiniana and Oaks. The vegetation here differed in nothing from that observed on the right bank of the Chuba on a former visit. Calochortus No. 306, which

285 Ceanothus cuneatus (Hook.) Nutt.
348 Madronella candicans (Benth.) Greene
355 Sphacele calycina Benth.
306 Calochortus luteus and C. venustus.

had been very common throughout the Sacramento valley, was still in flower here, the white variety being more common than the yellow.

"Early the following morning we were *en route* again, passing through an interminable wood of Pinus Sabiniana and oaks. Here I observed a pretty little Allium, No. 357, with purple flowers; Asarum, No. 364; Viola, 365; V. 366; Polemonium? No. 382; Hosackia bicolor; Mimulus bicolor, No. 376; and M. 377—the last two luxuriating in the sandy bed of dried up rivulets. Ascending the gradual acclivity, we left the region of Pinus Sabiniana, and entered that of Pinus Benthamiana, which seems to be the characteristic tree of the upper region.

"Some trees of this noble Pine attain an enormous size. The largest I measured were 28 feet in circumference, and 220 feet high. Of equal dimensions is P. Lambertiana, which however, does not constitute masses by itself, but is thinly scattered among the former. The same is the case with Thuja, No. 302, which rises to a height of 130 feet, by 12 to 15 in circumference.

Few plants occur in these pine tracts, the principal being Cyclobothra, No. 370; C. No. 371; C. No. 372; Calliprora No. 384; Iris, 373; Papaveracea, No. 383; and, in shaded places, Rubus, 374; Philadelphus, 375; Spiraea, 381; Pyrus florida, No.

351 ALLIUM ACUMINATUM Hook.?
364 ASARUM HARTWEGI Benth.
382 Perhaps 380 PHLOX DIFFUSA Benth.
376 MIMULUS BICOLOR Hartweg.
377 EUNANUS DOUGLASII Benth.
370 CALOCHORTUS CAERULEUS Wats.
371 C. BENTHAMI Baker
372 C. NUDUS Wats.
384 CALLIPRORA ANALINA (Greene) Heller
373 IRIS HARTWEGI Baker.
383 DENDROMECON
374 RUBUS PARVIFLORUS Nutt.
375 PHILADELPHUS CALIFORNICUS Benth.
381 OPULASTER CAPITATUS (Pursh) Kuntze

387; Rosacea, No. 392; and Taxus, No. 401—the latter, judging from the few specimens I saw, attaining only the size of a shrub or small tree.

"On the fourth day we reached Bear Valley, a beautiful little valley surrounded by a lofty ridge of mountains, which is well wooded with Pinus Benthamiana. The north side of the valley was still covered with snow. On the south side, however, a few spring flowers had made their appearance, among which I observed Paeonia californica, with brown petals edged with orange; Compositae, No. 398; No. 395; Ranunculus, No. 363; Corydalis, No. 362; and Nicotiana, No. 367. A new species of Pine, P. No. 413, occurred in the valley, of which I only saw two trees of dwarf growth, probably stragglers from a more northern latitude. The leaves stand in pairs, and are three inches long; cones two inches long, by one broad. In general appearance the tree is not unlike a young Scotch fir. The cones at the time of my first visit were open, and the seeds had fallen out.

"The upper end of the valley is bounded by a mass of granite, terminating in a precipice 800 feet in depth, below which the Chuba river is winding its way, appearing like a sheet of foam. In warm and sheltered situations, where the snow had melted, I observed an Allium; Pentstemon, No. 368; Statice, No. 369; Phlox, No. 380; and a Calochortus—the latter not yet in flower. The more elevated parts above Bear Valley, from the severity of last winter, were still several feet deep, covered with snow, for which reason we returned hence by the same road we came.

392 Chamaebatia foliolosa Benth.
395 Trientalis latifolia Hook.
363 Ranunculus Hartwegi Greene
362 Bicuculla formosa (Andr.) Coville
367 Capnorea californica (Benth.) Greene
413 Pinus Murrayana Balfour
368 Pentstemon Newberryi Gray
380 Phlox diffusa Benth.

Immediately upon my arrival at headquarters, I proceeded once more to the Upper Sacramento valley to collect such seeds as I could not procure before.

Having packed up my collections, and sent part by water to San Francisco, I left on the 30th of June for Monterey, in company with an American whom I had engaged as a guide. Towards evening of the same day we arrived at the junction of the Feather river with the Sacramento; and passing, the following morning, our luggage over in a canoe, we swam the horses across, the distance from shore to shore being not less than 300 yards. We now continued our course over the prairie on the right bank of the Sacramento river for two days, and crossed again to the south side in a ferry boat at the Straits of Carquinez.

A kind of tertian fever, accompanied by violent headache, under which I had been suffering some days previous to my departure, here developed itself into a quotidian fever and ague, which for want of proper medicines, the constant exposure to a tropical sun during the day, and camping out at night, soon reduced me to such a state of debility as scarcely to be able to sit on horseback.

From the Straits of Carquinez we passed along the Bay of San Francisco to the Pueblo of San Jose, and reached Monterey on the 8th of July.

Soon after my arrival (having, with the assistance of my little medicine chest, cured myself), I continued my excursions about Monterey as far as my returning strength permitted, and collected such kinds of seeds as I thought worth preserving. Towards the end of July I went over to Santa Cruz for a similar purpose, and whilst visiting a family upon their farm, with whom I had become intimately acquainted during their winter residence in Monterey, I was again taken ill with fever and ague. In addition to the seeds which I collected in the Santa Cruz mountains last year, I found the evergreen chestnut with ripe fruit. This shrub, of which I had been most anxious to procure seeds, attains the height of ten feet and is of a pyramidal form. The nuts, which are produced in prickly clusters on the points of the young wood, are each enclosed in separate cells, and are of the same size and shape as the beech-nut. The kernel is pleasant to eat, resembling the filbert in flavor.

"On August the 13th I returned to Monterey, and was once more laid up with fever and ague, from which I did not recover until the beginning of September.

"On September the 6th I went again over to Santa Cruz in quest of pine cones, which were now ripening. The sorts I procured were Abies Douglasii, Pinus californica, and P. Benthamiana. The cones of the latter were unusually scarce this season, and seem to have suffered from late spring frosts. A few cones were all I could procure of this sort. They were smaller than those of the preceding year, and contained but few good seeds.

"On September the 20th I again left Monterey for the southern parts, which, on account of the disturbed state of last year, I could not visit before. As guide I engaged the services of a man who had accompanied me on my last excursion to Santa Cruz, and who, from his profession as a hunter, was well acquainted with the intricate mountain paths of the district I intended to visit. On the day of our starting we reached the mission of La Solidad, an ill constructed, half ruined building, situate in the Salinas valley, and encamped towards evening on the banks of the Salinas river, within a short distance of the mission.

"By sunrise the following morning we were again on horseback, and leaving the main road on the right, we entered a mountain defile leading to the mission of San Antonio. Here I observed a shrubby Arctostaphylos, with large brown seeds; a half climbing Caprifolium (C. no. 133), profusely covered with scarlet berries; an evergreen shrubby oak (Q. No. 8); and a subdeciduous oak (Q. No. 7), the latter forming a tree thirty feet high.

"From San Antonio a range of mountains extends along the coast, attaining a great elevation, which, although apparently barren as seen from the mission, I was assured on the

122 LONICERA INTERRUPTA Benth.

western flank towards the sea is covered by large pines. The lower region of this range, at the foot of which the mission is built, is thinly covered by the evergreen Californian Oak, a Ceanothus, Cercocarpus, a small leaved shrubby Fraxinus, and Pinus Sabiniana—the latter at the time with ripe cones. An evergreen shrubby Prunus, called Islay, with a holly-like leaf, bearing a red fruit resembling the cherry-plum, grows also abundantly here. The thin pulp which surrounds the proportionate large seed is sweet and pleasant to eat. The kernel after being roasted and made into gruel, is a favorite dish among the Indians. Having ascended the first ridge, we passed through thickets of Arctostaphylos tomentosa and Ceanothus thyrsiflorus, and entered a forest of Pinus Lambertiana. The cones of this noble Pine are always hanging from the points of the branches, were by this time already open, and the seeds had fallen out. From cones that had been blown down I picked out a few seeds.

"Descending the western flank of the great mountain range I found at last the long-wished-for Abies bracteata, occupying exclusively ravines. This remarkable Fir attains the height of 50 feet, with a stem from 12 to 15 feet in diameter, one-third of which is clear of branches, and the remainder forming an elongated tapering pyramid, of which the upper part, for three feet, is productive of cones. Having cut down some trees, I found to my regret that the cones were but half grown, and had been frost-bitten. In more sheltered situations, towards the sea shore, the same happened to be the case; and I was thus precluded all hope of introducing this remarkable Fir into Europe.

A NEW CASTILLEJA FROM THE SOUTHERN ROCKY MOUNTAINS*

By P. C. Standley and J. C. Blumer

Castilleja austromontana

(*Rhexifoliae* Rydb.) Perennial from a light yellow, fleshy, semi-tuberous but divided root, this in age becoming dark and coarsely fibrous: stems 25 to 35 cm. high or sometimes even larger, usually several from each root, slender, generally simple but sometimes branched rather sparingly above or even near the base, sparingly or densely hirsute below, puberulent or scabrous or short-hirsute above, more or less villous in the inflorescence: leaves linear to linear-lanceolate, the uppermost usually lanceolate or wider, the lower commonly with only one conspicuous nerve, the upper manifestly 3-nerved, bright green, acute, narrowed or partly clasping at the base, glabrous above, scabrous beneath or puberulent or the lowest hirsute at least along the veins: flowers numerous, in a spike finally 10 cm. long or more, on pedicels 1 to 2 mm. long: bracts entire or with two broadly linear lateral teeth, or rarely with 1 or 2 additional shorter ones, lanceolate to broadly oblong, obtuse or acutish, 15 to 30 mm. long, usually 20 to 25 mm., the upper ones scarlet for most of their length, light green at the base, sparingly villous along the margins, the veins yellowish-green where they extend up into

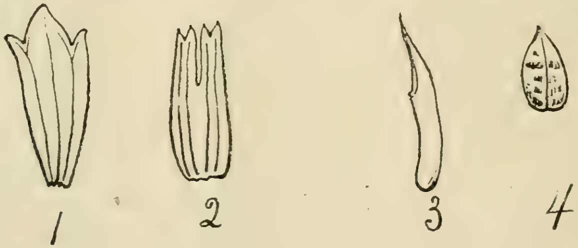

Figure 7: 1 An upper bract. 2 Calyx opened. 3 Corolla. 4 Mature capsule. All natural size.

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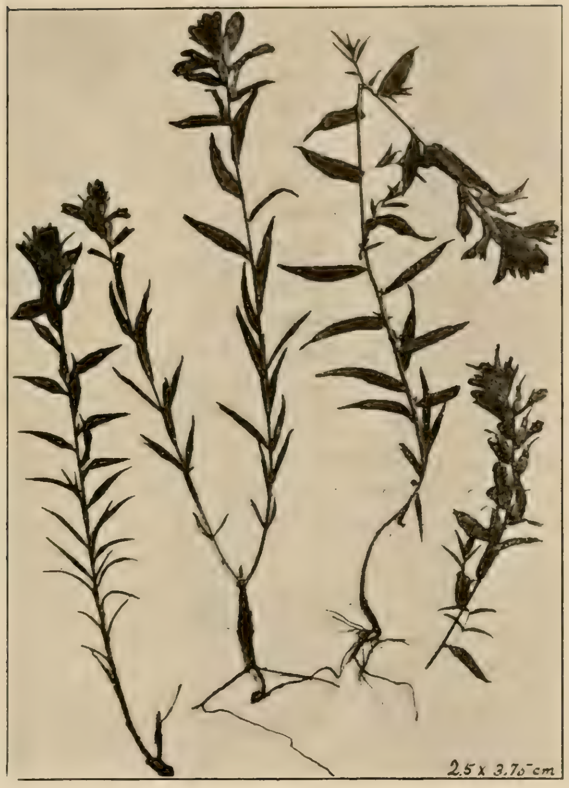
Plate 5



Castilleja austromontana Standley and Blumer the scarlet, conspicuously forked where the bract is toothed: calyx about 15 mm. long, tubular, finely glandular pubescent, ciliate along the veins, green, tinged with yellow, tipped with scarlet, about equally cleft before and behind for 5 mm. or less, the lateral divisions again cleft into shorter, linear-lanceolate to ovate-lanceolate, acute segments: corolla 20 to 25 mm. long or more, hence much exceeding the calyx, yellowish-green, puberulent, galea almost as long as the tube, slender, almost straight, faced with scarlet, lip green, 1 mm. long or less: capsules lanceolate in outline, acuminate, glabrous except along the veins which are sometimes ciliate even at maturity, 12 mm. long or less, straw-colored to dark brown under the sheath: seeds grayish-brown, triangular in side view, about 160 in each capsule.

Type sheet no *592577* in the National Herbarium, collected by J. C. Blumer in pine woods at Manning's Camp in the Rincon mountains of Arizona, September 24, 1909, no. *3411*, altitude about 2400 meters. Other collections made by Mr. Blumer in Arizona are as follows:

Pine woods near Webber Camp in the Santa Catalina mountains, July 7, 1909, altitude 2400 meters, no. *3195;* in the same mountains, October 5-7, 1910, near Soldier Camp, no. *3898*, Oracle Ridge, no. *3899*, Bear Wallow, no. *3967*, Upper Sabino creek, no. *3900;* in the pine zone in the Rincon mountains, altitude 2400 meters, July 23, 1909, no. *3280;* Spud Ranch, Rincon mountains, altitude 2220 meters, October 19, 1910, no. *3987;* on the summit of Mount Lemmon, altitude 2840 meters, in an open spot near aspens and snowberries, July 7, 1909, no. *3194;* on the east side of the crest of the Huachuca mountains, altitude 2550 meters, August 31, 1910, no. *3834*.

No. *3193*, collected in the Santa Catalina mountains on a ridge near Mount Lemmon under white firs, July 7, 1909, is, with but little doubt, the same; this plant is larger, about 60 cm. high, and has a few branches above. A few of its lower leaves have two linear lobes.

The herbarium of the University of Arizona contains the following specimens under the name *C. gloriosa* Britton, which is a doubtful segregate of *C. integra* Gray: One sheet from the

Santa Catalina mountains, without number, collected in July, 1905, by Mr. and Mrs. J. G. Lemmon; three unnumbered sheets from the same mountains, collected at Soldier Camp, August 7, 1906, by Professor J. J. Thornber and Dr. and Mrs. B. E. Livingston, one of these bearing yellow flowers, but otherwise quite typical; one sheet from the Huachuca mountains, where it grows on semi-shaded north slopes in Miller canyon, as collected by L. N. Goodding, his no. *329*.

Here belong the following specimens from New Mexico:

Mogollon mountains, 1881, H. H. Rusby, *317;* on Mogollon creek in the Mogollon mountains, altitude 2700 meters, 1903, Metcalfe *255* (distributed as *C. linariaefolia* Benth., with which, of course, it has no relationship). Specimens have been seen from the Black Range as well, besides several more from the Mogollones.

Some time ago New Mexican specimens of this plant were sent to Dr. P. A. Rydberg, who referred them to *C. lauta* A. Nelson. Perhaps its affinity is with that species, but the plant of Wyoming and Colorado has crimson or rose-colored bracts instead of scarlet, and its stems are glabrous, at least below, besides being very much stouter and more succulent.

SENECIO LANATIFOLIUS Osterhout

By George E. Osterhout

In the New Manual of Rocky Mountain Botany Professor Nelson has reduced *Senecio lanatifolius* to *Senecio Fendleri* A. Gray, aad says that it "has been collected but once and the specimens look as if they might be abnormal." The plants are not abnormal in the general sense of the word—a few plants do not differ in some peculiar character from the many others of the same species. It seems moreover to be separated from *Senecio Fendleri* by good and important characters, and has the marks of a good species, easily seperable from all other species of the genus. In saying, however, that it has been collected but once, he suggests that it is of quite limited range, and this is probably true. The type specimens were collected at Wolcott, Eagle county, Colorado, July 11, 1902. The locality is north of the Eagle river, on the rather steep mountain side which borders the river. The soil is light and loose, gray in color, made from a crumbling shale. Above and below it the formation is different, and this *Senecio* was not found outside this particular formation. Numerous clumps of it were found for some distance along the hillside. This was verified by revisiting the locality on May 25, 1910.

The Eagle river is a branch of the Grand river, entering it some distance above Glenwood Springs. While I can not speak with any degree of authority in regard to the geological formations, and have no work at hand from which I can quote, the formation below Glenwood Springs, on the north side of the river resembles that about Wolcott. But here is a long distance, more than a hundred miles, which is unpleasant to traverse, and which I suppose has been only partially looked into by botanists. Possibly where the soil is similar to that in which *Senecio lanatifolius* was collected, and where the difference in altitude is not too great, it will again be found.

It may be said too, that this region is noted for its peculiar plants, which are known only from the type locality. *Chrysothamnus leucocladus*, *C. laetevirens*, *C. fulcratus*, all collected and described by Dr. Greene, are known only from Grand Junction. *Oreocarya aperta*, *O. alata*, *O. nana*, and *O. cristata*, all described by Miss Eastwood, are known only from the country about Grand Junction. That peculiar plant, *Encelia nutans* Eastw., I think is known only from this same locality; and some other species could be cited. It is not then very peculiar that *Senecio lanatifolius* has been collected but once, or is known only from the type locality.

What can be said of the origin of these peculiar plants? Are they the product of this particular region, and of comparatively recent date? Why are they of such limited range? Perhaps some one can suggest a solution of these questions.

New Windsor, Colorado.

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Volume 7 Number 5

MUHLENBERGIA

MAY, 1911

Editors: A. A. Heller and P. Beveridge Kennedy

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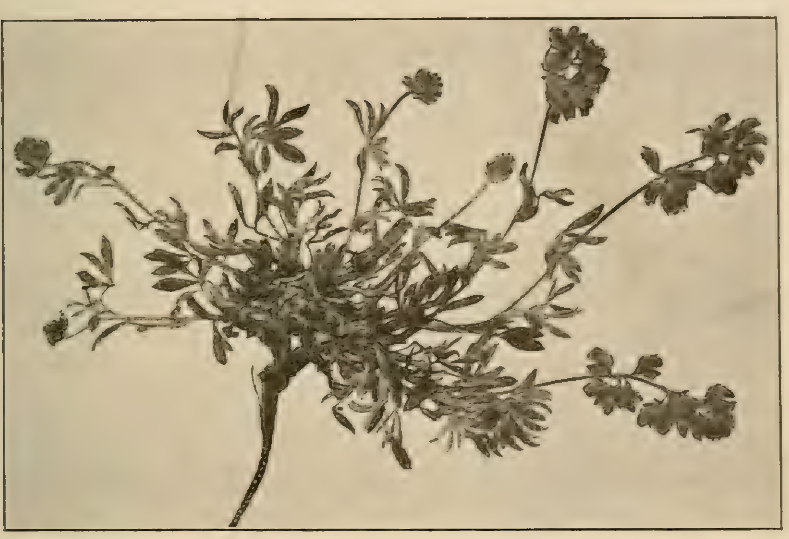

Lupinus Tidestromii Greene

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University of Nevada,
Reno, Nevada

Volume 7 May 15, 1911

MUHLENBERGIA

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HARTWEG'S EXPLORATIONS IN CALIFORNIA—IV

By Alice Eastwood

(Couclusion of narrative)

"Finding it impracticable to prosecute my journey to the south along the coast, from the numerous ravines which descend from the mountain range, I returned hence to San Antonio, and crossed by the farm of El Piojo, where the ridge is less elevated. A small pine wood, which became visible on our descent, extending along the beach, looked like an oasis in the desert—the dark green of the Pines forming a beautiful contrast with the parched-up fields. Upon a nearer examination I found the wood to be composed of a variety of Pinus insignis with larger cones than those about Monterey, from which it also differs in their being produced in less abundance. Following along the sea shore for nine miles, we struck inland again, and arrived at the mission of San Luis Obispo, from whence we proceeded over a flat and uninteresting country to the mission of Santa Ines. The whole of this route is but poorly wooded by a few stunted Oaks. On the ascent to the mission of La Purissima, the monotony of the bare hills was somewhat relieved by a small forest of Pinus Edgariana, which attains no larger size than those observed near Monterey.

"Previous to leaving Monterey, I was told by several persons that a kind of thin-shelled pine nut is occasionally brought for sale by the Indians to Santa Ines and Santa Barbara, without being able to learn any more respecting it. Upon making further inquiries at Santa Ines, I was told that the Indians bring them from a great distance, that the harvest then was over, but that I might procure a few of the mission Indians. Proceeding

22 1911

to a hut which was pointed out to me, I bought a gallon of the fresh seeds, and inquiring about the size of the cones, the Indian handed me two, with the information that the trees are of a small size, when, judge my surprise, I recognized in them those of Pinus Llaveana, which I had on former occasions found in several parts of Mexico.

"Seeing there was no prospect of enriching my collection of seeds by proceeding further to the south, I returned from Santa Inez to San Luis Obispo, near which mission the late Dr. Coulter gives the station of Pinus muricata, and which seemed to have escaped my notice when first passing through that place. Upon a nearer examination I found that on the "Crusta" or ascent from San Luis Obispo, only one kind of Pine is growing on the brow of the mountains, which proved to be P. macrocarpa.

"From San Luis we returned to San Antonio, over a flat and uninteresting road, and thence to Monterey, where we arrived on the 18th of October.

"On October 25th I again left Monterey, with my former [illegible] continuation of the San Antonio range of [illegible] from the nature of the ground on that side, [illegible] a different route. Following along the sea [illegible] of hills intersected by numerous deep [illegible] and our further progress impeded on the third day [illegible] extreme steepness of the range. The only objects derived from this excursion were some very fine cones of Pinus macrocarpa, some measuring 15 inches in length; they were growing on trees 30 to 40 feet high, in rather exposed situations, at an elevation of about 4000 feet above the level of the sea.

"By the beginning of November we returned to Monterey; the rainy season being now close at hand, and having no more excursions to make, I prepared to return to Europe with my collection."

THE FRUIT OF LUPINUS TIDESTROMII Greene

By C. P. Smith

Reference to the original description of this handsome lupine discovers no mention of the pods and seeds, evidently Dr. Greene's material having been in flower only. As I have found no published reference to this species since its "birth" (Erythea **3:** 17. 1895), I assume that some of my observations may be of interest.

I have seen it nowhere except at the type locality, Pacific Grove, Monterey county, California. I first collected it in 1906, in flower only, but two years later secured plenty of flowering and fruiting material, as well as ripened seeds. It is rather scattered in shallow sand along the path half encircling the government light house property at Point Pinos, tho little more than holding its own there; but amongst the Moss Beach sand dunes, a short distance to the southward, it is common and in its glory.

At the latter place I sought it on June 2, 1908, with special intent of getting fruiting specimens and seeds. Disappointment seemed to await me, however, for tho racemes in full bloom were still to be had, all of the fruiting racemes in sight had their pods completely dehisced, no seeds were apparent on the surface of the white sand; but down on my knees, a more careful search over the surface at last discovered one lone seed, then a second, and so on until some ten or twelve were brought together for examination. Then came the revelation. One unopened pod was seen sticking part way out of the sand, and the finding that it was one of several of an otherwise buried raceme, resulted in my soon having plenty of fruiting material in various stages of development. Also, a box full of mature pods, kept for some days in a dry place, was found to be a quicker method of securing plenty of seeds.

The full grown pods are about one inch long, *very succulent*, and *terete*, but shrinking considerably and becoming the shape of other lupine pods upon drying, pubescent with *soft white hairs*, 5 to 7-seeded: seeds about 2.5x3 mm., a little less than 2 mm. in thickness, mostly *rhomboidal to oblong*, *almost* *white, variously marbled with dark brown*, being practically indistinguishable when partly buried in the white sand, or even when lying on its surface.

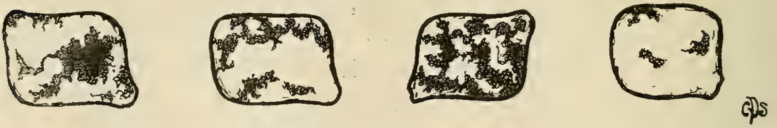

Figure 8 Seeds of *Lupinus Tidestromii* Greene

The peduncles are evidently not able to support the weight of the thick, fleshy legumes, and the loose drifting sand covers them until the tissues of the pods give up their excessive water content at the maturity of the seeds; whereupon the peduncles are able to again lift the fruits above the sand, and normal dehiscence and scattering of the seed follows.

I am not prepared to say how many lupine species have such swollen, succulent pods, but certainly none of the other species of my experience have that character. I have not had the pleasure of collecting *L. pachylobus* Greene, but according to the original description, that species has, "in the fresh plant," the pods "very thick and succulent, almost terete, weighing the branches, which are by no means slender, quite to the ground." These two species are not otherwise comparable, belonging to widely different groups, one being a decumbent perennial, the other an erect annual of the Micranthi section.

A point of greater importance, no doubt, is the further comparison of *L. Tidestromii* with *L. littoralis* Dougl., from which it is separated by Greene. The original description of *L. littoralis* states: "Pods linear, covered with bristly hairs: seeds linear, brown, with black spots." If this characterization is to be depended upon, I feel that my observations give added proof that *L. Tidestromii* deserves unquestioned recognition as a worthy species. It is also certainly distinct from *L. variicolor* Steud., a seacoast species frequent at Pacific Grove, which has, by some authorities, been referred to *L. littoralis*.

Utah Agricultural College, Logan, Utah.

SEEDLINGS OF LUPINUS TIDESTROMII

By A. A. Heller

A most interesting study during the past three months has been the development of seedlings of various species of lupines, the seeds of which were planted January 20th. Among them were a few of *L. Tidestromii*, for which I am indebted to Professor C. P. Smith. They were collected in June, 1908, and were so slow to germinate that I had about given up hope of obtaining any plants. But during the latter part of February the cotyledons of three plants appeared. The plants presented a peculiar appearance from the first. The cotyledons of most perennials are 10 to 15 mm. long, 7 to 10 mm. wide, and have fairly long petioles. These were smaller than the average, only about 7 mm. long, 4 mm. wide, very short petioled, and were closer to the ground than usual.

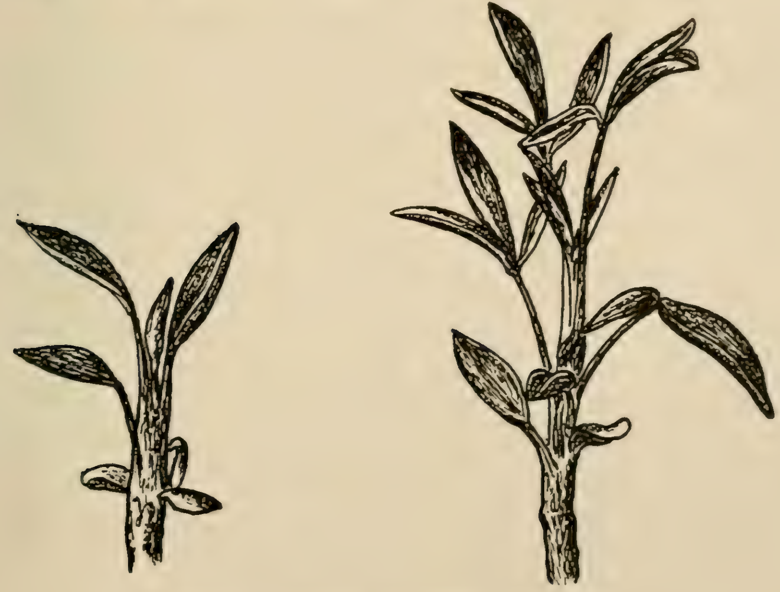

Figure. 9. Seedlings of *Lupinus Tidestromii*.

The plants are not rapid growers. The first photograph (figure 9, left hand plant) was taken March 29th, and shows the plant natural size at that time.

But the greatest surprise came when the first leaf unfolded. In all the species observed up to this time, the first leaf bore at least three leaflets, but in this species it is unifoliate, and the arrangement is alternate from the beginning. All of the other lupines now growing in our greenhouse, some fifteen, both annual and perennial, first produce about three pairs of opposite leaves, which, with the cotyledons, usually wither and disappear by the time the plant is ready to bloom.

In this species the fourth leaf generally bears two leaflets, and, as may be seen in the right hand figure, the succeeding ones bear three leaflets. The right hand plant was photographed May 2d, and shows four leaves of three leaflets. The plant was 6 cm high at that time. The drawing would seem to indicate that the plant is glabrous, but it is really silvery with very closely appressed short hairs, a condition almost impossible to represent in a drawing.

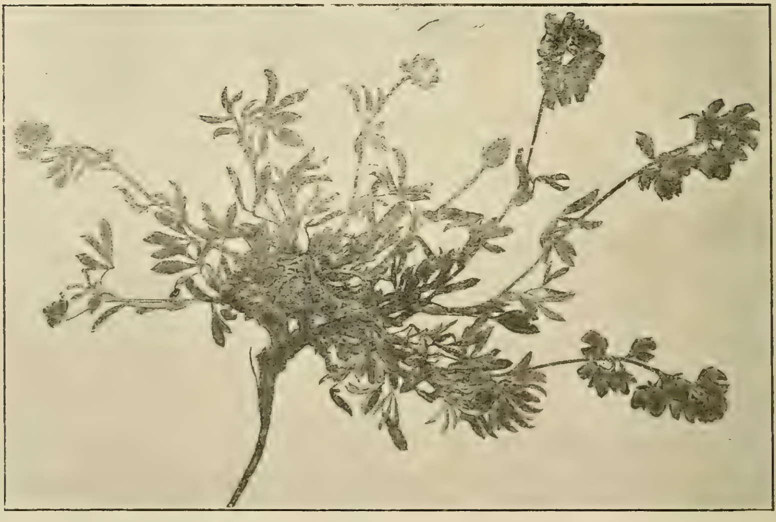

Figure 10. *Lupinus Tidestromii* Greene

The accompanying half tone, which fairly well represents the prostrate habit of the plant, is from a specimen from the type locality, my no. *6787*, collected at Point Pinos, Pacific Grove, May 27, 1903. A close examination of two sheets of this number, as well as *Chandler 362*, collected at the same place, shows that there are almost without exception only three leaflets, rarely a leaf with five leaflets appearing. Greene says "leaflets mostly 5 only."

L. Tidestromii is certainly distinct from *L. littoralis*, there being very little resemblance between the two species. *L. littoralis* is much less silvery, is a larger plant, has longer and narrower leaflets, somewhat smaller flowers of a darker color, the pods are larger, containing more seeds, and the seeds themselves while of practically the same color and marking when mature, are longer in proportion, as shown by specimens collected at practically the type locality, Clatsop Beach, Oregon.

RECENT LITERATURE

CONE-BEARING TREES OF THE CALIFORNIA MOUNTAINS. By J. Smeaton Chase. Illustrated. Pp. 99. Chicago. A. C. McClurg & Co. 1911.

A PHYTOGEOGRAPHIC AND TAXONOMIC STUDY OF THE SOUTHERN CALIFORNIA TREES AND SHRUBS. By Leroy Abrams. Pp. 186. Plates 10. Bulletin of the New York Botanical Garden, Vol. 4, No. 21. 1910.

A FLORA OF WESTERN MIDDLE CALIFORNIA. By Willis Linn Jepson, Ph. D. Second edition. Pp. 515. Cunningham, Curtis and Welch. San Francisco. 1911.

In the increasing attention which is now turning to forestry throughout the whole country, the Pacific coast is having its share. Within the last five years Miss Eastwood has given us her Handbook of the Trees of California, and Mr. Sudworth his Forest Trees of the Pacific Slope, and in recent months Dr. Jepson has brought out his Trees of California and has further enriched the literature of forestry with his magnificent Silva. To these books are now to be added two of the works mentioned above.

Mr. Chase's little book supplies a reliable popular guide to the coniferous trees of the California mountains, admirably adapted to the use of summer visitors to the forests who may wish an introduction to the trees in whose goodly company they find themselves. Its size suits it to the pocket, and its simple and untechnical descriptions demand no botanical knowledge for the identification of the trees. A further aid is afforded by good photogravures of each species and line drawings of the fruit. The author modestly disclaims being a botanist, but botanists will not find matter for criticism in his pages, which is not always the case with books which attempt to popularize science.

The paper in which Professor Abrams presents some of the results of his herbarium and field studies of the southern California flora is a most interesting and valuable contribution to knowledge of the distribution of the ligneous and lignescent plants of that region. He begins his paper with a few pages devoted to the physiography and climatology of the southern counties, and then discusses in detail the various phytogeographical divisions and subdivisions which result therefrom. With the exception of the confused and isolated remnants of a Boreal flora which occupies the summits of the highest mountains, the whole remaining region is Austral, in which Merriam's three zones are readily distinguishable. These, and their several subordinate components, are described, and the characteristic trees and shrubs belonging in each are listed. The author does not explain why he omits all reference to the flora of the coast islands, whose origin and development present a problem full of interest, nor does he bring out as clearly as could be desired the zonal interpenetrations and insulations characteristic of the southern California flora.

The larger part of the paper is devoted to an annotated list of the trees and shrubs, the value of which is greatly enhanced by the keys provided for the families and genera. Under each species the type locality is cited in the original words, and the distribution, both general and in southern California, is defined. Then follows a list of the specimens examined, which are largely of the author's own collecting, an evidence of the wide extent of his field work. Where necessary sufficient synonymy is cited, which at times is a grateful aid to the recognition of the plant intended; for, as may be inferred from the journal in which the paper is published, it represents the extremest school of neo-americanism, both in segregations and in the names adopted; indeed, it is not without its own contributions to the instability of American botanical nomenclature. But this, whether regarded as a merit or a fault, is a matter of little moment; the important thing is that the author tells us much of value about the plants themselves. The scope of his paper frees him from the necessity of deciding what constitutes a tree, but leaves him to draw the uncertain line that separates a shrub from a suffrutescent or suffruticose plant; but while there are a few doubtful cases, both of inclusion and of exclusion, the decision has been generally made with sound judgment.

The new edition of Doctor Jepson's Flora presents itself in an enlarged form and a very neat binding. It contains about the same number of species as the first edition, the additions being offset by the reductions. The sequence of families has been altered in accordance with present views of relationship and descent, and almost every page shows more or less traces of revision. The treatment of the Gymnosperms is practically new, while in most cases the revision is confined to slight changes in the keys or descriptions. Mr. Chandler contributes the genus *Nemophila* in accordance with his monograph, and Miss McDermott an entirely new and good account of *Trifolium.* The text of the Glumaceae is nearly unchanged from that proposed by Mr. Davy for the first edition. The international rules of nomenclature are followed to the advantageous displacement of *Allenrolfia*, *Adenostegia*, *Bolelia*, *Blepharipappus*, and other names used in the first edition. *Cerasus* is reduced to *Prunus*, *Malus* to *Pyrus*, *Brevoortia* to *Brodiaea*, and similar changes are made indicative of the author's increased conservatism in the estimation of generic values. In its new form the Flora enters a second decade of usefulness, and we can only regret that its author did not enlarge its scope to include the whole state.—S. B. PARISH.

SPRING FLORA OF THE WASATCH REGION. By A. O. Garrett, A. B., head of the Department of Biology, Salt Lake High School. Skelton Publishing Company, Salt Lake City. 1911.

This excellent little volume, neatly bound in cloth, has just been published by Mr. Garrett for the use of the high schools and colleges of Utah. Though the work does not attempt to cover the entire State, it does include that portion in which dwells a large majority of its population, namely, the western base of the Wasatch mountains and the plains and valleys adjacent.

As the title indicates, the great bulk of the summer plants are not included, only species known to bloom before June 16th being admitted. However, a summation of the forms included shows some 370 species and varieties, 190 genera, and 78 families. A key to the families precedes the descriptive text, and suitable keys to the genera and species are inserted in their proper places throughout the work. Mr. Garrett's position in matters of nomenclature is rather conservative, yet sometimes lenient toward views that are commonly classed as radical. *Sisymbrium* is treated *sensu latu*, while the *Cymopterus* segregates are treated *sensu strictu.* In his preface he says: "Believing that an international code is preferable to one of local application, the writer has endeavored to follow the rules of nomenclature established by the Vienna Congress." And again: "Because of the extremely divergent views held by botanists to day, both regarding nomenclature and specific and generic limitations, the writer gives a more extended synonymy than is usually thought necessary for so limited a manual; but it will be found that an extensive list of synonyms is absolutely required by the teacher who does not have access to a fairly complete botanical library. In order that these synonyms be in the most convenient place, they have been put immediately after the accepted name of the plant, instead of at the end of the descriptlon as is usually done."

While the work is necessarily a compilation, it is due the author to say that he has spent several years in active, conscientious field work in considerable of the territory treated, and much evidence of his studies is to be found in the book. Like most publications of such a nature, this work has been the proverbial "labor of love," and Mr. Garrett is certainly to be congratulated on the general make-up and appearance of the book, the excellent typography, and the scarcity of typographical errors. The book is well adapted for the use for which it is intended, and will also be of interest to students of systematic botany generally, since no manual of the flora of the Great Basin is yet in existence.—C. P. SMITH.

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A. A. HELLER

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A. A. Heller,

539 West 5th street, Reno, Nevada

Volume 7 Number 6

MUHLENBERGIA

JUNE, 1911

Editors: A. A. HELLER and P. BEVERIDGE KENNEDY

An ancient English oak

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University of Nevada,
Reno, Nevada

Volume 7 August 31, 1911

MUHLENBERGIA

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NOTES FROM NORTHERN UTAH—III

By C. P. Smith

Isatis tinctoria L. Early in May while Mr. Geo. L. Zundel and myself were driving along a lane southwest of Brigham, I stopped and gathered a lone roadside specimen of a small flowered mustard new to me. A few rods further on two or three more plants were secured, and soon a third stop was made in front of a dwelling, where a large patch of the same species was too interesting to be passed. Here the plant was of the habit of the common tansy, and I had no thought but that it was planted there, as tansy and such plants are semi-cultivated about houses; hence I was surprised when informed by the "lady of the house" that it was a weed that had recently appeared in their vicinity, was now common in the fields, and had not been knowingly planted in front of her place. Well-started fruit was obtained here, and reference to Nelson's Manual, a copy of which was at hand, left us convinced that the plant was not to be determined with that book.

A half hour later large patches of yellow in distant fields attracted our attention, patches that would have been carelessly accepted as *Brassica nigra* without examination, had the time been about the middle of June; but our new experience was still in mind, so we drove far out of our way to investigate. We were well paid for our trouble, indeed, for there was our plant in grain and alfalfa fields, much imitating the habit of the common and notorious black mustard, and prolific enough to suggest its becoming an equally bad weed in this country. Altho so common there now, it was a new plant for Mr. Zundel also, and as he has spent most of his life about Brigham, knowing the country well, we can believe that the plant may be of recent introduction.

A common plant in Europe, and at least formerly cultivated in this country, it seems strange that it has not escaped from gardens in our eastern states sufficiently to be mentioned in our manuals along with *Lobularia*, *Hesperis*, *Lunaria*, etc. However, I find ~~no~~ mention of it except in Gray's Field, Forest, and Garden Botany, where it is characterized thus:

"Dyer's Woad. Rather tall, glabrous and glaucous, the stem-leaves lanceolate and entire, sessile and somewhat saggitate; racemes of small yellow flowers panicled, succeeded by the hanging samara-like closed pods; flowers in early summer. Old gardens; formerly cultivated for a blue dye." And from the key to the genera may be learned further that the fruit is one-cavitied, one-seeded, and indehiscent. To this I may add that the one seed is strictly pendent in its cavity, dark straw-color, linear-elliptic, about 3x1 mm. in size; the pod oblanceolate, dark brown when matured, about 12x4 mm., the stigma sessile and scarcely evident on the well-rounded apex of the pod.

Several efforts to determine the plant were fruitless, as I neglected to consult Gray's work, quoted from above, but finally I ran across the record of *Myagrum perfoliatum* L. in Britton's Manual; whereupon I at first thought that I had finally named my plant, but later was less satisfied and felt it wiser to submit a specimen to Dr. B. L. Robinson, to whom I am indebted for the correct determination. Then I discovered the description of *Isatis* in Gray's work, and got information that I might have read some months before, and also found the illustration of *Myagrum* in Britton and Brown's Illustrated Flora. No one, having good drawings, descriptions, or specimens of both *Isatis* and *Myagrum*, should have trouble in distinguishing between the two genera; but it is interesting to note that they have in common small yellow flowers and one-seeded, indehiscent pods, the seeds pendulous.

C. P. Smith 2123 and *G. L. Zundel 150*, Box Elder county, Brigham (Perry), 9 May, 1910. Mr. Zundel secured matured fruit on July 18th.

ERUCA SATIVA Hill. Another mustard determined for me by Dr. Robinson. I have as yet seen no record of it in any of our books except Bailey's Encyclopedia of Horticulture. So far as known to me, it is confined to a bit of ground, uncultivated in 1910, near the vegetable garden on the Agricultural College farm, Logan. Probably over fifty plants were present, tho none were noticed there in 1909. Conditions for its spreading are not very favorable, and it may not even hold its own there very long. Many plants were cut down, with other weeds during the summer, but a few were allowed to go to seed. It is the "roquette" of European gardens, and undoubtedly an escape from the college garden. The head gardener claims that "a garden mustard" was planted years ago, but he has no records of what it was. His assistant says that none such has been planted within the last six years.

The flowers of this plant resemble very much those of *Raphanus sativus* as commonly growing about San Francisco bay, California, the whitish petals soon changing to yellow, usually purple veined. The plant in fruit, at least at some distance, resembles somewhat *Cakile californica* Heller; but the technical characters agree with none of the genera recognized in our North American manuals, the two rows of seeds in each valve running it into *Diplotaxis*, and the large, flat, sword-shaped beak making one want to associate it with *Sinapis alba*.

LATHYRUS LATIFOLIUS L. The perennial pea of our seed catalogs and gardens is frequent in yards in Logan, readily persisting without attention, but apparently not escaping much to the waysides, probably because its need of more moisture than such places afford in this arid country. I gathered one specimen from a plant growing along an old irrigation gutter outside of a neglected but irrigated yard, where the species was a prominent resident. I mention it only in comparison with the next.

LATHYRUS SYLVESTRIS L. Another perennial pea of the group with two leaflets is seemingly well established along an irrigation ditch on the Agricultural College farm, tho I did not see it there in 1909. The plants along the main ditch were mowed over and it did not seed; but a few specimens that got into some bushes to one side ripened and scattered many seeds, while the perennial roots of the others were probably not destroyed.

This plant has much more slender leaflets and much smaller flowers than has the preceding species. My determinations of both are based upon the descriptions and keys in Bailey's Encyclopedia of Horticulture.

No. *2209*, Cache county, Logan, 25 June, 1910.

VICIA VILLOSA L. Planted on the Agricultural College farm some years ago in connection with forage investigations, and still persistent along certain ditches, making luxuriant growth in 1910, but probably not adaptable to dry farm conditions, so that rapid spreading for it is unlikely. It seeded abundantly in 1910 before being laid low by the scythe, and plants in bloom in September and even in October, were probably from seeds of the season.

No. *2082*, Cache county, Logan, 21 September, 1909.

AQUILEGIA LEPTOCERA Nutt. I have looked in vain for a diagnosis of the genus *Aquilegia* that would allow for more than five carpels, and regret that the original description of this species is not at hand. However, my experience with this large, white, long-spurred form bids me claim that the expression "carpels five or more," would not be amiss. I found the plant plentiful in the canyons around Logan Peak, and on the mountain slopes on the west side of the Franklin Basin, Idaho, and it is probably common in suitable places throughout the Bear river range.

I was surprised to note the irregularity in the number of carpels, specimens being taken with as high as twelve in some heads, six, seven, and nine being of frequent occurrence, but none less than five. Tabulations would certainly be of interest, and I will not lose another opportunity to make more of a study of this variation, existing, as it does, in nature. I should be glad to hear from others who have noticed any diversity of the number of follicles in this genus. I have one specimen of *A. flavescens* Wats. which has six carpels in one head.

My collections of what I here call *A. leptocera* are: No. *2203*, Cache county, Logan, Dry canyon, 23 June, 1910; no. *2218*, Cache county, Spring Hollow of Logan canyon, 28 June, 1910.

ACER GLABRUM Torr. Amongst seed of this species collected in 1909, I note one fruit of three carpels. This, however, is evidently a monstrosity not worthy of record, but I make note of it for the benefit of anyone who might be interested.

LUPINUS FLAVOCULATUS Heller. A fine specimen of this species, in full flower, has been kindly given to me by Dr. E. D. Ball, who collected it at Green River, Utah, 17 May, 1909, the same day that Mr. Heller secured his type material at Rhyolite, Nevada. This specimen agrees perfectly with the co-type in my possession. This is a slight extension of the known range. A specimen of Jones' *1657* is in the Utah Agricultural College herbarium, and I agree with Mr. Heller that it is this species.

Utah Agricultural College, Logan, Utah.

NOTES ON DISTRIBUTION OF CASTILLEJA ON THE MEXICAN BOUNDARY

BY J. C. BLUMER

Herewith are given some notes, chiefly on distribution, on the species of *Castilleja* that occur in the Mexican boundary region. The species have been determined or described by Mr. Paul C. Standley, of the National Herbarium. They are given in the order of publication. Where the numbers of collections are cited, they were made by the writer. The notes on Mexican distribution are from Miss Eastwood's paper on the Castillejas of Mexico.

C. LINARIAEFOLIA Benth. DC. Prodr. **10:** 532. 1846.

Coulter and Nelson give this *Castilleja* as occurring "throughout our range, and west to Pacific States." In Miss Eastwood's recent monograph on the Castillejas of Mexico, *C. linariaefolia* is noted as replaced in Central America by two other species. This species was found in arroyos in Sonora by Thurber, making a "plant 4-6 feet high." Similarly it was found on the bottom of White river, a large sand wash in southeastern Arizona, altitude about 5000 feet, where it grew abundantly in places, two to three feet high. Here it was collected July 11, 1907, no. *2027*. It would be interesting to know whether it is always or usually a riparian plant.

C. LAXA Gray, Bot. Mex. Bound. 119. 1859.

The type of this species was collected by Charles Wright on hillsides near the Mexican village of Santa Cruz, just over the boundary in northeastern Sonora. It appears to be distributed from Arizona to Sonora and Durango. Collected in the upper Sonoran zone in the Rincon mountains, Arizona, at an elevation of 5800 feet, September 13, 1909, no. *3354*, and again in the same zone of the same mountains at 6500 feet, October 20, 1909, no. *3492*. At the first station it was growing in clumps under evergreen oak trees in leaf mold on top of a ridge, giving a handsome mass effect. At the second station it occupied a similar habitat of comparative dryness among chapparal on a sunny southeast slope. First collected in the same zone (6000 feet) in the Chiricahua mountains, on top of a ridge near Wilgus ranch, September 2, 1908, no. *2132*. On August 18, 1908, what is probably this species was collected in the Upper Sonoran region of the Sierrita mountains, no. *2565* in open ground, no. *2566* (habitat not stated), and no. *2567* in a dry gulch. No. *2565* was met at Warsaw Mills, in the Pajarito mountains, which was one of Dr. E. A. Mearns' collecting stations. Here it occurred in a somewhat protected place in a gulch, as might be expected, for the elevation is only about 4000 feet That the species has a very extended flowering season is indicated by the fact that it was here gathered in bloom on April 21, 1909. Even two days previously it was found on an open, dry bank, but in the bottom of the deep and tortuous Canyon de los Alisos on the boundary, altitude about 3500 feet, no. *2641*. These collections indicate that *C. laxa* is a species quite generally distributed at middle altitudes of the boundary region.

C. INTEGRA Gray, Bot. Mex. Bound. 119. 1859.

Distributed from Colorado to Arizona, Chihuahua, Sonora, and western Texas. Among its earliest collectors were Wright and Bigelow. Collected in the Rincon mountains on a north slope at about 7500 feet, October 3, 1907, no. *3116*, and also in an upward extension of the Transition zone in the Santa Catalinas, at 8000 feet, July 7, 1910, no. *3212*, and a few hundred feet lower, June 16, 1910, no. *3712*. Near Paradise in the Chiricahuas it was found October 17, 1907, no. *2242*, and October 22, 1907, no. *2270*, the latter at 6000 feet, the former on limestone at 6500 feet. One lone flower was gathered in the same mountains October 22, 1906, at Rhoda Rigg's ranch, no. *1893*, at as low an altitude as 5500 feet, but it was hidden among shrubs along the creek. Also referred here is no. *2800* from the Pesquira hills near Arivaca, in southeastern Arizona, collected March 30, 1909, by Miss Eva Sine, "high up among rocks on a mountain side." Unless this was a north slope, it may prove to be distinct from *C. integra*, as the altitude was only 3500 to 4000 feet.

In the Rincons *C. integra* is a species of the Transition zone, and forms a connecting link between *C. laxa* of the Upper Sonoran zone below, and *C. austromontana* of the Canadian zone above. The species occurs as single stemmed or few stemmed plants only, not in many stemmed clusters as does *C. laxa* here. From *C. austromontana* it differs in its more scattered occurrence. By its structure and velvety appearance, it is very distinct from either. All three here grew upon essentially the same kind of soil, derived from schistose granite or mica schist. At places where the contact of the Transition and Canadian zone is well marked by major species, *C. integra* and *C. austromontana* also meet, but do not overlap, and each species thus characterizes its own zone. Whether the same is true where *C. integra* and *C. laxa* come in contact is not yet clear, as opportunity to examine this point did not present itself.

In ascending the Santa Catalina range from Oracle, the three species were found succeeding one another in the same order, each characterizing by its range the climatic conditions of its own zone. To be sure, upon reaching the crest of Oracle ridge, what was to all appearances *C. laxa* broke into the zone of *C. integra* again after having once been left behind, but this may have been due to exposed conditions, or else to peculiar soil, since the locality is near a mineral belt. To some degree the difference in climate between the three zones is reflected in a corresponding difference in at least one detail of structure—pubescence. *C. laxa* is quite hairy, *C. integra* has a short, fine velvety pubescence, while *C. austromontana* is hairy only at the base and in the inflorescence, mostly scabrous or barely puberulent elsewhere, becoming almost entirely glabrous in the most humid habitats.

C. LANATA Gray, Bot. Mex. Bound. 118. 1859.

This strikingly handsome white woolly plant was collected by Wright in the early days. Its distribution appears to be southern Arizona, western Texas, Coahuila, and Zacatecas. Found on a very steep south slope on Marble peak in the Santa Catalina mountains, elevation 7500 feet, October 6, 1910, no. *3912*. The late flowering may be due to the fact that the slope was burned over in June. The soil here is whitish, somewhat loose, and very calcareous. Recently F. E. Lloyd collected it in Zacatecas, which is a limestone region. It is not improbable that the species will ultimately be found limited to limestone or calcareous soils. In keeping with other limestone plants, it shows much more xerophytic structure than is ordinarily found at this elevation. Near this species, tho possibly quite distinct, is no. *3691*, collected April 10, 1910, on a steep northeast slope on the east side of the northwest spur in the Boboquivari mountains. The elevation here is only about 4000 feet, and the soil granitic. The exceedingly woolly character of the plant seems to be well adapted to the low elevation. The dense tomentum of the stem is slightly yellowish. It may or may not prove to be *C. tomentosa* Gray, collected at Mabibi, Sonora, June, 1851, by George Thurber.

C. MINOR Gray, Bot. Cal. **1:** 573. 1876.

This unique species of *Castilleja* was found by the earlier collectors in New Mexico, Chihuahua, and Sonora, and by the writer in the Rincons and Chiricahuas of Arizona. In the latter it was found in a springy, shady spot near a brook in Riggs canyon at an elevation of only 5700 feet, June 24, 1907, no. *1810* (prepared by Miss Bettie Stephen). In the Rincons it was first found August 23, 1909, on springy pasture soil at Miller's cabin (Spud ranch) at 7400 feet elevation, where a considerable colony occurred, no *3307*. Again it was seen on similar springy soil in a gulch near Anvil Rock, several hundred feet higher. Naturally the plant is simple, but by grazing it often becomes much branched. Some plants in rich soil measured as much as three feet, and the long, narrow, deep crimson streamers known as bracts made them objects of great beauty. *C. minor* is a plant apparently associated with springs. Had Dr. Gray seen specimens from Miller's cabin, he undoubtedly would have given the plant a less humble name. However, the Rincon specimens may be exceptional.

C. PATRIOTICA Fernald, Proc. Am. Acad. **11:** 56. 1904.

This species was described from specimens collected by Townsend and Barber in the Sierra Madre mountains of Chihuahua. The writer's no. *1379* was collected at Barfoot Park, Chiricahua mountains, September 15, 1906. Here it was very abundant on recently lumbered pine land lying at 8000 feet elevation.* Both this and the following species showed much tendency toward variation. These varieties showed no constancy, however, hence did not present additional species. A rather remarkable fact is that this species, so abundant here, did not occur at all in the neighboring Rincon and Santa Catalina ranges.

C. BLUMERI Standley, Muhlenbergia **5:** 46. 1909.

Type collected by the writer, same date and place as the preceding, no. *1380*. It is found only occasionally in the drier places, associated with *C. patriotica*, but is very distinct in its small, deep crimson bracts. Also, the long exserted corolla of *C. patriotica* is not at all in evidence in this species. So far it has not appeared elsewhere. Further notes on this and the preceding species have been given in this journal as cited above.

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*For a sketch of the flora of Barfoot Park, see Muhlenbergia 4: 77. 1908.

C. CRUENTA Standley, Muhlenbergia **5**: 82. 1909.

The type of this species was one of four specimens found by the writer on a rhyolitic ridge just north of Wilgus ranch in the Chiricahua mountains at an altitude of 6000 feet, September 2, 1907, no. *2133*. A single plant was found on the east side of the Rincon mountains, altitude between 6500 and 7000 feet, October 5, 1909, no. *3454*. The very broad and obtuse flowering bracts, prettily clustered near the top, are of a bright red color showing a tinge of rose red when dry. This species apparently had not been previously collected, and is probably rare.

C. AUSTROMONTANA Standley and Blumer, Muhlenbergia **7**: 44. 1911.

The type is no. *3411*, from the Rincon mountains, September 24, 1909. It had been frequently collected by others as well as the writer, as detailed in the above reference. Two collections not before mentioned are no. *3713*, Camp Huntsman, and no. *3714*, east spur of Mt. Lemmon, both in the Santa Catalinas, June 16, 1910. Specimens have also been found in the Huachucas in Arizona, and in New Mexico in the Mogollon and the Black ranges. In the northern Rincons, so far as determined from one season's observations, it is the only *Castilleja* of the Canadian zone and the real pine forest, and is similarly abundant in the high Catalinas.

Where the species meets *C. integra* some intergrades have been found, both in the Santa Catalinas and the Rincons, and these point to hybridism. These intergrades are so few in number that they do not in the least invalidate either species. Meeting points may be found near tops of ridges, giving southwest aspects where *C. integra* belongs, and northeast aspects where *C. austromontana* is at home. At one place where the two were found growing side by side, *C. integra* was the first to bloom, as might be expected from its lower range. This earlier blooming under identical conditions of environment, indicated that it was not merely an effect of external conditions upon individuals, but had become an hereditary character of the species.

C. austromontana blooms from June to October, but the individual plants vary much in season, as well as in size, color, habit, structure of leaf, etc. A little plant found on a sunny gravelly hillside in the high mountains was at first taken for *C. laxa* because of its small size (six inches), hairiness, and yellowish cast. This form did not reappear, and it was probably only a habitat form of *C. austromontana*. It is interesting to note that the warm and dry conditions of this habitat produced a form resembling *C. laxa*, which is native to a warm and dry zone. In more humid situations, on the other hand, are found plants easily two feet in height, dark green and smooth with broad leaves conspicuously three-veined. Yet these extremes are the exception, and, as is so commonly the case with plants of locally general distribution, the variations between one and the other extreme are so multifold and constantly in evidence, that no one knowing the plant in the field would make more than one species of it. Having seen only the extremes in the herbarium, even the most cautious systematist might feel justified in making two species out of it. Hence the importance of a knowledge of the plant as it grows. One dried specimen may give an idea of a species, but a true concept can only be gained by seeing living plants before you in their native habitat, and, as often happens, associated with their nearest relatives in several, hundreds, or thousands of individuals.

Tucson, Arizona.

AN ANCIENT ENGLISH OAK

By P. Beveridge Kennedy

(With cover illustration)

England is one of the most interesting places to visit on account of the magnificence of her trees. This particular oak that we have been fortunate enough to photograph, makes us at once respectful as we contemplate its age and the historic surroundings in which it is situated. It is said to be about a thousand years of age. There is no placard to indicate its interest to the visitor to Hampton Court Palace and Park, and indeed few of the hundreds of thousands of tourists who frequent the spacious banquet halls and rooms of Cardinal Woolsey and Henry VIII ever know of its whereabouts. You will also be fortunate if you happen to meet an official who could direct you or who knows anything about it.

As it is probably one of the oldest oak trees in England, and is situated in one of the old hunting parks of the royalty, we can regard it with considerable botanical significance.

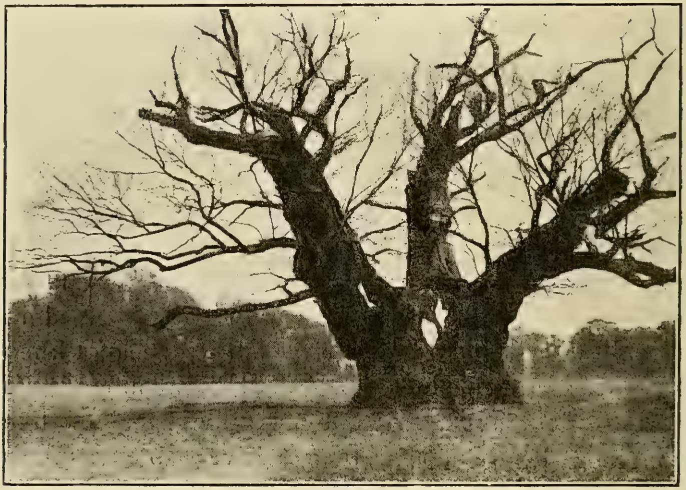

Figure 11 An ancient English oak

The trunk is about forty-five feet round, and hollow in the center sufficient to accommodate a dozen or more persons. The black walls indicate that at some recent time it has either been set on fire from within by careless boys, or it may have been struck by lightning.

When the photograph was taken, all the smaller branches were coming into bud, while the large older ones were mostly dead wood.

Hampton-on-Thames, England, June 1, 1911.

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Reno, Nevada, under the Act of Congress of
March 3, 1879.

ANNOUNCEMENT

A new edition of the Catalog of North American Plants is in preparation. Thus far 116 pages have been printed, and other parts will follow as fast as possible. In all there will be about 300 pages. Since a considerable time must elapse before the work can be completed, the 116 pages and other parts as soon as issued, will be sent to those who wish to have them in that form, for $1.25. payment to be sent with the order.

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Volume 7 Number 7

MUHLENBERGIA

JULY, 1911

Editors: A. A. HELLER and P. BEVERIDGE KENNEDY

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Nolina Parryi Wats.

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University of Nevada,
Reno, Nevada

Volume 7 September 30, 1911

MUHLENBERGIA

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ADDITIONS AND EMENDATIONS

By S. B. Parish

Professor Abrams' recent "Study of the Southern California Trees and Shrubs" (Bull. N. Y. Bot. Gard. **6:** no. 21) includes an extended list of the woody plants of that region, and an account of the distribution of the several species. Yet a few have been overlooked, and of other few the ranges may be extended. The subjoined list is offered as a supplement to his paper, the species added being those with full place citations, while those without are extensions of range.

The line which divides a shrub from an undershrub, or from a suffrutescent plant, is not a rigid one, and students will not in every case agree in drawing it. Perhaps it is for this reason that some of the plants in the following list do not appear in that of Abrams. The omission of the Loranthaceae is so marked that they may be of these. Yet it seems impossible to rank such a plant as *Phoradendron flavescens* other than as a shrub, and it is so called by authors, among them Britton and Brown in the Illustrated Flora. But as regards most of the additions there is not likely to be a difference of opinion.

NOLINA PARRYI Wats.

The type of this species was collected in 1876, by Parry, near Whitewater, altitude 1300 feet, on the borders of the Colorado desert. It is infrequent there, usually solitary, and with poorly developed caudex. On the Mojave slope of the San Bernardino range, in the neighborhood of the Morongo King mine, altitude 5700 feet, it is abundant in groves, and with bare trunks 4 to 6 feet tall. From the Colorado desert it passes into the Cismontane region along the rough country between San Jacinto

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and Palomar mountains, in San Diego and Riverside counties, nearly to the Santa Ana river. Coahuilla, abundant in groves and well developed, June, 1882, *Parish 910;* Pala, altitude 400 feet, *Orcutt;* hills near Corona, *Lester.*

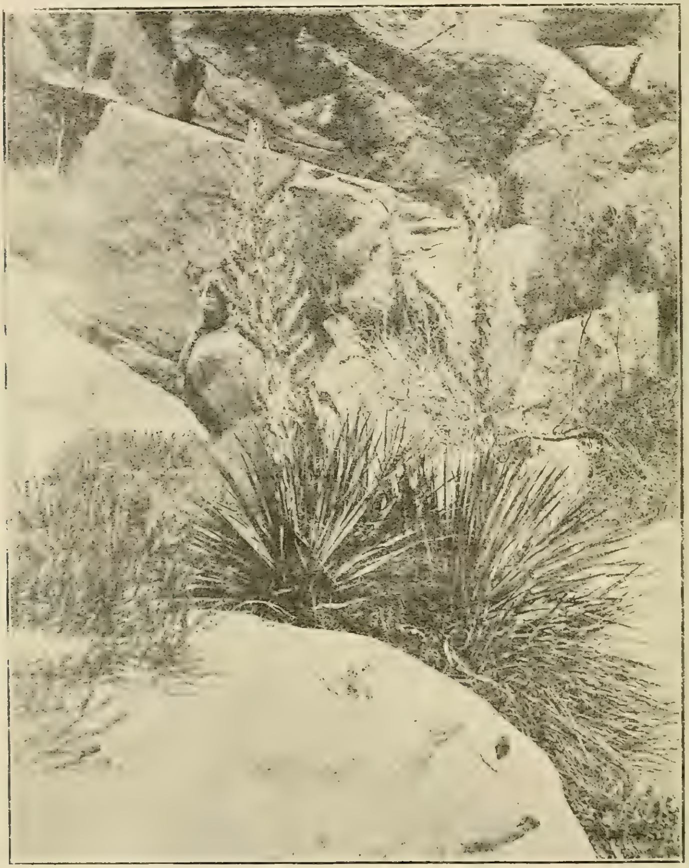

Figure 12. *Nolina Parryi* Wats. Snow creek, in the type vicinity, where the acaulescent form is the most common. Photograph by W. G. Wright.

NOLINA BIGELOVII Wats. Proc. Am. Acad. **14**: 247. 1879.

Caudex 2 to 3 feet, and scape 2 feet tall. Mountain Springs, San Diego county, at the edge of the Colorado desert, and near the Mexican boundary line, June, 1880, *Parish 711*, and at the same place and date by *George R. Vasey.*

YUCCA MOHAVENSIS Sargent

Common on the south side of the San Bernardino valley; Colton, Reche canyon.

POPULUS TRICHOCARPA Torr. & Gray

Common in the canyons of the southern slope of the San Bernardino mountains.

SALIX EXIGUA Nutt.

Cushenberry Springs, Mojave desert, and Palm Springs, Colorado desert.

PHORADENDRON FLAVESCENS Nutt. var. MACROPHYLLUM Engelm. in Rothr. Geog. Surv. w. 100th Merid. **6:** 252.

Common on Populus, Salix and Alnus, and rarely on Platanus; among cultivated trees on neglected apple and pear and on *Robinia pseudacacia.*

PHORADENDRON FLAVESCENS Nutt. var. VILLOSUM Engelm. l. c.

Common on oaks, notably on *Quercus Kelloggii.* On *Platanus racemosus*, Burcham's ranch, *Parish.* On *Forestiera neomexicana*, Lancaster, *Davidson.*

PHORADENDRON BOLLEANUM Eichler, Fl. Bras. **5:** part 2. 134 m.

On *Juniperus californica*, San Bernardino valley. The larger leaved form on *Abies concolor*, San Bernardino mountains.

PHORADENDRON CALIFORNICUM Nutt. Journ. Acad. Phila. II. **1:** 185.

In the Colorado desert, mostly on Prosopis, but occasionally on *Dalea spinosa*, and according to Pac. R. R. Rep. **5:** 26, on *Larrea mexicana.*

PHORADENDRON JUNIPERINUM Engelm. in Gray, Mem. Am. Acad. **4:** 58.

On *Juniperus occidentalis* Bear valley, San Bernardino mountains. On *Pinus monophylla*, between Rose mine and Bear valley.

PHORADENDRON JUNIPERINUM var. LIBOCEDRI Engelm. in Brew. & Wats. Bot. Cal. **2:** 105.

On *Libocedrus decurrens*, San Bernardino and San Jacinto monntains.

ARCEUTHOBIUM DIVARICATUM Engelm. in Rothr. Geog. Surv. w. 100th Merid. **6:** 253.

On *Pinus monophylla*, northern slope of the San Bernardino mountains, Cushenberry canyon, Cox's ranch, etc.

ARCEUTHOBIUM OCCIDENTALE Engelm. in Brew. & Wats. Bot. Cal. **2:** 107.

On *Pinus Coulteri*, *P. Lambertiana*, *P. ponderosa* and its var. *Jeffreyi*, San Bernardino and San Jacinto mountains.

ERIOGONUM GIGANTEUM Wats. Proc. Am. Acad. **20:** 271.

Santa Catalina island, 1884, *Lyon;* 1888, *Hasse;* 1901, *Grant.*

ERIOGONUM FORMOSUM Brandegee, Bot. Gaz. **26:** 456.

San Clemente island, August 25, 1894, *Brandegee.*

SARCOBATUS VERMICULATUS (Hook.) Torr.

This has been reported from the coast of San Diego and Orange counties. "San Luis River valley, John Wolf, 1873," according to Fernow, U. S. For. Bull. 2d ed. **2:** 220. "Beaches and neighboring alkaline mesas of Orange county," according to McKenny, Bot. Centralb. **10:** part 3. (9).

CERASUS ARIDUS Greene

The type specimens were gathered from trees growing by stream banks in Bear valley, altitude 6500 feet, and not "on the borders of the desert at the eastern base of the San Bernardino mountains," as stated in the description. It belongs to the Transition or Nevadan, and not to the Sonoran flora.

CERCOCARPUS INTRICATUS Wats. Proc. Am. Acad. **10:** 346.

Providence mountains, according to Brandegee, Zoe **5:** 149.

RUBUS VITIFOLIUS C. & S.

Abundant inland to San Bernardino valley.

ADENOSTOMA SPARSIFOLIUM Torr.

Near Santa Monica, *Hasse.*

CASSIA ARMATA Wats. Proc. Am. Acad. **11:** 135.

In the Lower Sonoran of the Mojave desert. Fish Pond station (Daggett), May, 1882, *Parish 1285;* Warren's Well, 3500 feet altitude, June 16, 1894, *Parish 2981;* Canyon Springs, 1905, *Hall 5843.* Providence mountains, according to Brandegee, Zoe **5:** 148.

CALLIANDRA ERIOPHYLLA Benth. Lond. Journ. Bot. **3:** 105.

Near Mesquite station, Colorado desert, April, 1881, *Parish 762*, in half mature fruit.

HOFFMANSEGGIA MICROPHYLLA Torr. Bot. Mex. Bound. 50.

Canyons of the Colorado desert. Palm Springs, Indian Wells, Toros, *Parish;* Coachella, *Greata.*

RIBES GRACILLIMUM Coville & Britton.

Extends as far eastward as Eden Hot Springs, near Beaumont, where collected by *Greata* in 1908. Also near Temecula, *W. G. Wright.*

RIBES QUERCETORUM Greene

Box Spring mountains, *F. M. Reed.* Reche canyon, *Parish.*

EVONYMUS PARISHII Trelease, Trans. St. Louis Acad. **5:** 354.

San Jacinto mountains above Strawberry valley, at about 6000 feet altitude, June 25, 1881, *Parish 957.* Cuyamaca mountains, June, 1897, *Parish 4411;* 1894, *Brandegee.* Palomar mountains, 1896, *McClatchie;* 1897, *Parish;* 1904, *Chandler.*

GLOSSOPETALON SPINESCENS Gray, Smiths. Cont. **5:** 29. *pl. 12.*

Water canyon, near Cushenberry Springs, north slope San Bernardino mountains, at about 5000 feet altitude, May, 1882, *Parish 1291.*

ACER MACROPHYLLUM Pursh, Fl. **1:** 257.

Usually several-stemmed rather than with a single trunk, and seldom exceeding thirty feet in height. Common, but not abundant, along permanent streams in canyons of the southern slope of the San Bernardino mountains, at 3000 to 4000 feet altitude. Near Pasadena, *McClatchie.* San Gabriel mountains, *F. Grinnell, Jr.* Waterman canyon, *Parish.*

ACER BERNARDINUM Abrams, Torreya **7:** 219.

Snow canyon, San Bernardino mountains, 6500 feet altitude, June 20, 1901, *Parish 5128.* Probably the *A. glabrum* of

Hall in Univ. Cal. Publ. Bot. **1:** 93, is the same. He found a single specimen near Round valley at between 7500 to 8000 feet altitude. The Snow canyon station is a Hudsonian "island," and the species properly belongs, no doubt, at higher altitudes, and is rare.

ACER NEGUNDO L. var. CALIFORNICUM Sargent, Gard. and For. **4:** 148.

Along streams in canyons near Yucaipe, east of Redlands; Live Oak canyon, Oak Glen canyon.

AESCULUS CALIFORNICA Nutt. in Torr. & Gray, Fl. N. A. **1:** 251.

Abundant at Fort Tejon, and a few scattering trees in Antelope valley as far as La Liebre rancho, *Davidson*, *Parish*.

RHUS INTEGRIFOLIA B. & H.

Extends inland to the hills near Declez, a little west of Colton.

RHUS LAURINA Nutt.

This has the same inland extension as the preceding species.

CEANOTHUS ARBOREUS Greene, Bull. Cal. Acad. **2:** 144.

Santa Catalina island, *Lyon*, *McClatchie*, *Grant*.

CEANOTHUS PERPLEXANS Trelease, in Gray, Syn. Fl. **1:** part 1. 147.

Potrero, San Diego county, April 6, 1889, *Orcutt;* Coahuilla, May, 1899, *Hall;* abundant at Eden Hot Springs, near Beaumont, April 8. 1908, *Greata;* Banning, May, 1892, *Davidson;* Thomas valley, according to Hall, Univ. Cal. Publ. Bot. **1:** 84.

AYENIA PUSILLA L. Act. Stock. **1756:** 23. *pl. 2.*

Usually indicated as suffrutescent, but in our region it has perennial woody stems a foot or more long. Andreas canyon, Palm Springs, April, 1882, *Parish 1225*.

SPHAERALCEA AMBIGUA Gray, Proc. Am. Acad. **22:** 292.

Often low and only suffrutescent, but sometimes with woody stems three to four feet long. Palm Springs, *Parish 4108;* Cushenberry Springs, *Parish 4927*.

HORSFORDIA NEWBERRYI Gray, Proc. Am. Acad. **22:** 297.

Rocky ravines at Toros, Colorado desert, April, 1880, *Parish 200.*

OPUNTIA CHLOROTICA Engelm. & Bigel.

Notable for its solitary, tall and erect habit of growth. Not rare, but seldom abundant, on the desert slopes of the mountains, at 4000 to 5000 feet altitude. San Felipe, Palm canyon, Morongo King mine, *Parish;* McHaney's mine, *Alverson.* Providence mountains according to Brandegee, Zoe **5:** 49.

OPUNTIA ANGUSTATA Engelm. & Bigel. ex Engelm. Proc. Am. Acad. **3:** 292.

Northeastern slope of the San Bernardino mountains from Rattlesnake canyon to Bairdstown, at the upper end of Bear valley, at 5000 to 7000 feet altitude. At the highest point of this range there is a commingling of the Upper Sonoran and Transition vegetation, and in winter the temperature is low, and there is considerable snow fall. The type range is "from Zuni, west of the Rio Grande, westward to the Cajon Pass in the California mountains." I refer the plants to this species with hesitation, and they may be of an undescribed species.

OPUNTIA HYSTRICINA Engelm. & Bigel.

Ivanpah, in the Mojave desert, *Parish.*

OPUNTIA URSINA Weber in Bois, Dict. Hort. 869.

Ord mountains, Mojave desert, *Alverson.* The type specimens were collected at this station.

OPUNTIA PARRYI Engelm. Am. Journ. Sci. II. **14:** 339.

McHaney's mine, near Seven Palms, 1895, *Alverson.*

OPUNTIA BASILARIS Engelm. & Bigel. var. RAMOSA Parish, Bull. Torr. Club **19:** 92.

Common on both deserts: Whitewater, Palm Springs, Rabbit Springs. Also in the Cismontane: San Jacinto plains, San Timoteo pass, and San Bernardino valley, where it is very infrequent. The species occurs at the head of Cajon pass.

OPUNTIA RUTILA Nutt. in Torr. & Gray, Fl. N. Am. **1:** 555.

Providence mountains, according to Brandegee, Zoe **5:** 49.

OPUNTIA BIGELOVII Engelm.

One of the most abundant cylindropuntias of the Colorado desert, and also frequent in the eastern parts of the Mojave desert, often forming extensive thickets of pure growth.

ECHINOCACTUS POLYANCISTRUS Engelm. & Bigel. ex Engelm. Proc. Am. Acad. **3**: 272.

Mojave desert near Daggett, 1893, *W. G. Wright.* This must be near the type locality, which is given in Pac. R. R. Rep. **4**: 29, as "gravelly hills and sandy plains at the headwaters of the Mojave, on the eastern slope of the Californian Cordilleras, one days journey before reaching Cajon Pass, March 15, 1854." Coville (Cont. U. S. Nat. Herb. **4**: 110) reports it from the same region. One of the rarer species.

ECHINOCACTUS VIRIDESCENS Nutt. in Torr. & Gray. Fl. N. Am. **1**: 554. *O. Orcuttii* Engelm. mss. ex Orcutt, W. Am. Scientist **2**: 49. *f.* *O. limatus* Engelm. mss. ex Coulter, Cont. U. S. Nat. Herb. **3**: 337.

Hills near San Diego.

CEREUS ENGELMANNI Parry in Engelm. Am. Journ. Sci. II. **14**: 338.

Very common in both deserts: Mountain Springs, San Felipe, Whitewater, Hesperia, Camp Cady. Providence mountains, according to Brandegee, Zoe **5**: 149.

CEREUS MOJAVENSIS Engelm. & Bigel. ex Engelm. Proc. Am. Acad. **3**: 281.

In rounded masses of twenty to one hundred or more compacted heads 6 to 12 inches high. Mojave slope of the San Bernardino mountains; Cushenberry canyon, May, 1882, *Parish 1243;* Green Lead mine. Also at Ivanpah. McHaney's mine near Seven Palms, *Alverson.* Providence mountains, according to Brandegee, Zoe **5**: 149.

LYCIUM ANDERSONII var. WRIGHTII Gray

Reaches Riverside, where it was collected by Reed in Terquisquite canyon.

Lycium Parishii Gray

According to C. F. Baker (in lit.) there is a "considerable colony" of this species near Elsinore.

Lycium Torreyi Gray

In the Mojave desert at Hawley's station and Camp Cady, *Parish.*

Beloperone californica Benth.

This must be added to the list of desert plants which reach the San Diego district. Lakeside, June, 1897, *Hubby.*

Salvia mohavensis Greene. *Audibertia capitata* Gray

In rocky ravines at Camp Cady in the Mojave desert, May, 1882, *Parish.* Also at Ivanpah, 1882, *Parish 1637.*

Eriodictyon Parryi Greene

So far as I have seen, this plant is strictly herbaceous.

Baccharis glutinosa Pers.

Reaches as far west, at least, as Banning, *Parish 726.*

Artemisia spinescens D. C. Eaton

Hesperia; Rabbit Springs, May, 1882, *Parish 1258;* Lancaster, *Davidson.*

2. The Southern California Juncaceae

Mr. M. L. Fernald has kindly called my attention to an error in my paper in this journal for December, 1910. The Juncus collected by Abrams under no. 3847 should be referred to *Juncus sphaerocarpus.* This old-world species had been confused by American botanists with *J. bufonius* until Mr. Fernald, in Rhodora **6**: 39. 1904, rectified the error. The following change is necessary in my key to the southern California Junci:

Annuals	
Capsule trigonous-oblong to ovoid, 3-4.5 mm. long, embraced at maturity by the ascending floral segments	
All four segments linear-lanceolate, exceeding the capsule; seeds ovoid, apiculate	J. bufonius
Inner segments obtuse, little if at all exceeding the capsule; seeds truncate	J. bufonius halophilus
Capsule subspherical to short-ovoid, 2-3 mm. long; mature segments loosely ascending, with spreading or subsquarrose tips	J. sphaerocarpus

JUNCUS SPHAEROCARPUS Nees, Flora **1818**: 521. *J. bufonius* L. var. *capillaris* Buchenau, Bot. Zeit. **35**: 201.

Borders of Cuyamaca lake, June 23, 1903, *Abrams 3847;* vicinity of Strawberry valley, 4600 feet altitude, San Jacinto mountains, June, 1901, *Hall 2076;* Santa Ana river, San Bernardino valley, 1000 feet altitude, May 15, 1901, *Parish 4785*. Also at Santa Ysabel, San Diego county, May, 1852, *Thurber 620*, according to Fernald, l. c.

The species has a wide range in the old world, extending in Europe from Portugal to southern Russia, and occuring also in Mongolia and in northern Africa. In the United States it has been collected in Idaho, Oregon, California and Arizona.

JUNCUS EFFUSUS L.

The specimens referred in my paper to this species would come under the var. *Pacificus* Fernald and Wiegand, Rhodora **12**: 89. 1910. This is distinguished mainly by its fastigiate inflorescence.

San Bernardino, California.

ADDITIONAL SOUTHERN CALIFORNIAN COMPOSITAE

BY H. M. HALL

A number of species of Compositae not mentioned in my earlier paper (Univ. Calif. Publ. Botany 3: 1-302. 1907) are now known to occur in southern California. These are enumerated below, together with a few notes on other species.

TRICHOCORONIS WRIGHTII Gray. Dr. H. E. Hasse has collected this Mexican plant in a cienega near Beaumont, Riverside county, where it was doubtless introduced. It is very different from all our other species of Eupatorieae, to which tribe it belongs, being a flaccid weed-like herb, with homely dull white or pinkish heads.

PENTACHAETA ALSINOIDES Greene. This species of middle California has been collected by Miss Alice Eastwood at Gaviota, Santa Barbara county. The only other known station south of Santa Clara county is Arroyo Grande, San Luis Obispo county (Miss M. Alice King), but it is to be expected elsewhere in the coast ranges. The dichotomous branching, small discoid heads, and only three or four pappus bristles should serve to distinguish it.

PENTACHAETA AUREA Nutt. A beautiful color-form has been discovered at El Toro, Orange county, by Mr. Theodore Payne. The rays are white, except at the very base, which is yellow, fading to rose-purple, the disk yellow, the plants otherwise as in typical *P. aurea*. In this form, which grew in abundance near the station at El Toro, according to Mr. Payne, the plants are 10 to 30 cm. high, sparsely pubescent on stem and leaves, and with very glabrous involucres 7 mm. high. The achenes are densely hirsute, rather sharply 5-angled, and with 5 pappus bristles. It is much more handsome than typical *P. aurea*, the 25 to 60 white rays, each 10 mm. long, contrasting splendidly with the yellow disk. The disk corollas are slightly irregular in the usual manner.

HAPLOPAPPUS PANICULATUS var. VIRGATUS Gray. Two specimens of this variety were collected in alkaline soil along the margins of Dry lake, near Rosamond, in northwestern Los Angeles county, in 1896, *J. Burtt-Davy 2251*, *2942*. In my *Compositae of Southern California* it should stand next to *H. gossypinus*, from which it is readily distinguished by the strictly racemose heads and distinct, green tips of the involucral bracts.

ERIGERON COMPOSITUS Pursh. Summit of Mt. San Gorgonio, June 26, 1904, *Mrs. C. M. Wilder*. The rays are short and pale, but very evident in some specimens.

ECLIPTA ALBA (L.) Hassk. On low land near Imperial, December 11, 1907, *Hall 8004*, and Laguna ranch near Los Angeles, December 19, 1907, *Theodore Minthorn*. This insignificant annual may be distinguished from our other Heliantheae by its involucral bracts, which are in two similar series.

TRIXIS CALIFORNICA Kellogg, Proc. Cal. Acad. **2**: 182. *f. 53*. 1862. This is the proper name for the only species of *Trixis* in southern California. It may be distinguished from *T. angustifolia* by the glandular instead of tomentose lower surface of the leaves. Our specimens are much paler than those from Cedros Island, the type locality, but the two forms are evidently conspecific.

PICRIS ECHIOIDES L. Plentiful along ditches at Huntington beach, Orange county, 1909, *Ira J. Condit;* also in the suburbs of Los Angeles near Cienega, September, 1910, *Theodore Minthorn*. An introduced weed resembling *Sonchus*, but the herbage bristly and the pappus plumose.

University of California, Berkeley, California.

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ANNOUNCEMENT

A new edition of the Catalog of North American Plants is in preparation. Thus far 116 pages have been printed, and other parts will follow as fast as possible. In all there will be about 300 pages. Since a considerable time must elapse before the work can be completed, the 116 pages and other parts as soon as issued, will be sent to those who wish to have them in that form, for $1.25, payment to be sent with the order.

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University of Nevada,
Reno, Nevada

Volume 7 November 17, 1911

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THE NORTH AMERCAN LUPNES—V.

By A. A. Heller

Lupinus laxiflorus Dougl.; Lindl. Bot. Reg. **14:** *pl. 1140.* 1828.

One of the species specially looked for on my journey to the Columbia river region in 1910 was *L. laxiflorus.* Douglas is supposed to have collected it "about the great rapids of the River Columbia," now known as Cascade Locks.

No species resembling this one was noticed about Cascade Locks, but some ten or fifteen miles farther up the river one began to appear in abundance, and specimens of it were obtained at Hood River, Oregon, growing in open grassy places near trees. That this was *L. laxiflorus* I had no doubt, coming as it did from the type region, and having a spurred flower, as it has usually been described in our books.

Later I discovered that my plant did not agree with the figure in the Botanical Register, which shows a spurless flower and a much narrower leaf. But the description accompanying the plate says the upper calyx lip has "a sort of bag at its base," or "basi saccati," as given in the Latin. Then I decided that nothing further could be done until there was an opportunity to examine trustworthy material.

During the past summer (1911) I had an opportunity to examine material of what appears to be this species, in the Torrey Herbarium at the New York Botanical Garden and at the Gray Herbarium at Cambridge. According to the labels Douglas collected these specimens at Fort Vancouver, Washington. There are no other specimens in either of these herbaria that

NOV 25 1911

agree with the Douglas plants, nor up to that time had I seen any elsewhere. But later a single specimen collected by Howell at Mill Plain, the Fort Vancouver of Douglas' time, and identical with his plant was found in the herbarium of the Missouri Botanical Garden.

I have come to the conclusion that if these specimens truly represent *L. laxiflorus*, the species is a strictly local one, and may not be found except in the vicinity of Vancouver or Mill Plain, Washington. That this should be true is not strange, for there are a number of other species with but a limited distribution. Those who have become accustomed to looking upon this species as widely distributed and embracing all sorts of forms, may find some difficulty in accepting this conclusion. The following is the original description, given in the Botanical Register:

"*L.* laxiflorus; perennis, herbaceus, undique pilosus, floribus subalternis ebracteolatis, calycis labio superiore integro basi saccato: inferiore longiore ovato acuminato, carina imberbis, vexillo obcordato, foliolis 7-9 lineari-lanceolatis, stipulis minimis subulatis.

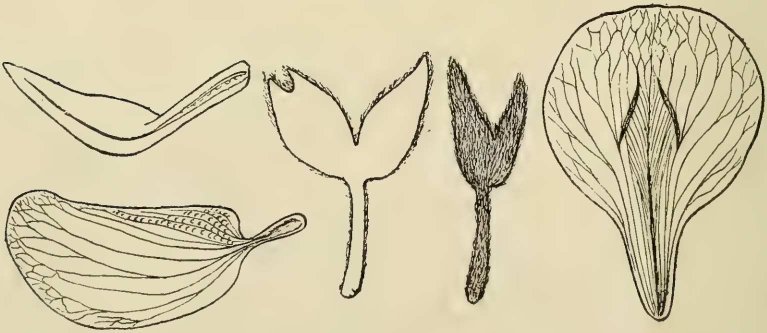
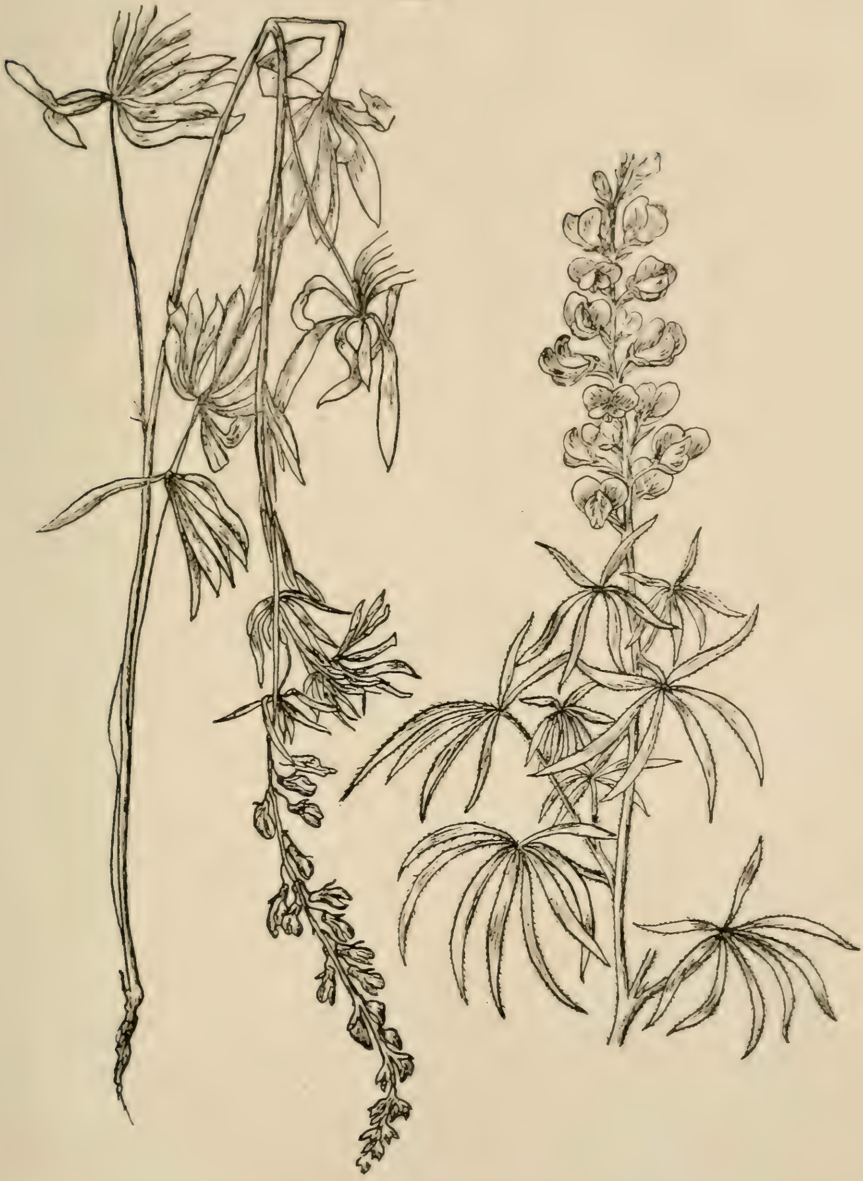


Figure 13. Floral parts of *Lupinus laxiflorus*, enlarged

"L. laxiflorus. *Douglas Journ. ined.*

"Caules caespitosi, graciles, elongati, pilosi, purpurascentes, 1-1½ pedales, basi in spontaneis suffruticosi. Folia caulina, dense pilosa, stipulis minimis, subulatis, foliolis 7-9, lineari-lanceolatis. Racemi laxi pedunculati; bracteae subulatae, longi-

Plate 6



Lupinus laxiflorus Dougl.

From specimen in the Torrey Herbarium

From plate in the Botanical Register

tudine pedicellorum, deciduae, pilosissimae. Calyces subalterni, densi pilosi, ebracteolati, labio superiore, ovato, basi saccato, abbreviato, inferiore ovato, acuminato. Vexillum caeruleum, obcordatum, carina imberbi, alisque erubescentibus.

A small, slender, perennial species, found by Mr. Douglas in dry, open, gravelly plains, about the great rapids of the River Columbia, where it is very common, forming patches of considerable extent, occasionally acquiring a suffruticose habit.

"The flowers are blue mixed with pink, and, although not equal in appearance to some of the larger species, extremely beautiful: they appear in August and September. Our drawing was made in the Garden of the Horticultural Society.

"Grows readily in common garden soil: it has not yet produced seeds; but will increase by division of the root.

"Stems tufted, slender, pilose, purplish, 1-1½ feet long. Cauline leaves densely pilose; stipulae subulate, very small; leaflets 7-9, linear-lanceolate. Racemes lax, stalked; bracteae subulate, the length of the pedicels, deciduous, very pilose. Calyxes somewhat alternate, densely pilose, without bracteolae; the upper lip short, ovate, entire, with a sort of bag at its base; the lower ovate, acuminate. Vexillum blue, obcordate, with the keel, which is beardless, and the wings pale rose-colour. J. L."

As may be seen from plate 6, the copy of the illustration in the Botanical Register does not agree, so far as flowers are concerned, with the wild specimens. I am inclined to think the artist was at fault. No lupine flower known to me presents an obcordate banner like the illustration, and it is far too broad to agree with the banner of the wild flowers. Dr. Kennedy kindly looked up this species while in England last summer, and informs me that the specimen marked "cultivated" could hardly have furnished the illustration.

LUPINUS NANUS Dougl.; Benth. Trans. Hort. Soc. II. 409. *pl.* *14. f. 2.* 1835.

Lupinus affinis Agardh, Synopsis 20. Dec. 1835.

For some time I have suspected that perhaps the plant we have been calling *L. affinis* might not be the species Agardh described under that name, for a careful reading of his description shows lack of agreement in several particulars.

Last summer while examining the lupines in the Gray Herbarium, I came upon one of the originals, collected by Douglas, upon which Agardh based his description, and saw at once that it was a specimen of *L. nanus.* Later Miss Eastwood wrote from Kew Gardens, England, saying that she had not only noted the specimen in the Gray Herbarium, but had seen the type of *L. affinis*, and that it is the same as *L. nanus.*

LUPINUS ONUSTUS Wats. Proc. Am. Acad. **11:** 127. 1876.

Lupinus pinetorum Jones, Cont. West. Bot. **8:** 25. 1898.

A growing suspicion that the above names represent but a single species was confirmed during the past summer, when the type of Watson's species was seen at the Gray Herbarium, and that of Jones at the National Herbarium. At the latter place there is also a co-type of *L. onustus*, giving ample opportunity for comparison. The type of *onustus* was collected in Indian valley, Plumas county, California, that of *pinetorum* near Susanville, Lassen county, northeast of Indian valley, but on the east slope of the Sierra Nevada.

Lupinus oreganus n. sp.

Erect perennial about 5 dm. high: stem exclusive of the inflorescence barely 5 dm., leafy throughout, silky with white appressed hairs, but showing purple underneath: petioles on the lower part of the stem about 1 dm. long, those above 6 or 7 cm.: stipules short, the lowermost barely over 1 mm. long, acuminate from a triangular base, the others subulate, 2 mm. long: leaflets about 10, rather firm, yellow-green and glabrous above, somewhat appressed silky beneath, mucronulate, those of the lowermost leaves oblanceolate, rounded at the apex, 4 cm. long or less, 12 mm. wide, the others acute at apex, longer, except the uppermost: peduncles 7 or 8 cm. long: inflorescence 2.5 dm. long, overtopping the leaves: flowers scattered, or somewhat whorled above, numerous but not appearing crowded, pale violet purple: bracts lanceolete, 5 mm. long, 2 mm. wide near the middle, early deciduous: pedicels 7 mm. long, very silky sericeous as is also the calyx, the lower lip of which is 7 mm. long, 5 mm. wide when spread out, the apex barely acutish, apparently minutely 3-toothed; upper lip nearly orbicular when spread out, 5 mm. across, with a broad notch at the apex; both lips concave in nature, especially the upper, which is saccate at the base; a small bractlet less than 2 mm. long on the calyx below the sinus: corollas 1 cm. long, 8 mm. deep, distance between apices of banner and wings 2 mm. or less: banner appearing as if a little shorter than the wings, face narrow, less than 2 mm., deeply grooved, 5 mm. long, edges turned back and meeting, somewhat inrolled, a short keel-like point on the back at the apex, the base deeply concave within but not spurred; wings 7 mm. deep across the middle, thence obliquely sloping to both base and apex, the latter blunt and rounded, 3 mm. across, edges closed dorsally, the keel exposed only at its apex, ventral edges also apparently meeting; keel glabrous, falcate, rather stout at the apex, 5 mm. deep across the middle: pods and seeds unknown.

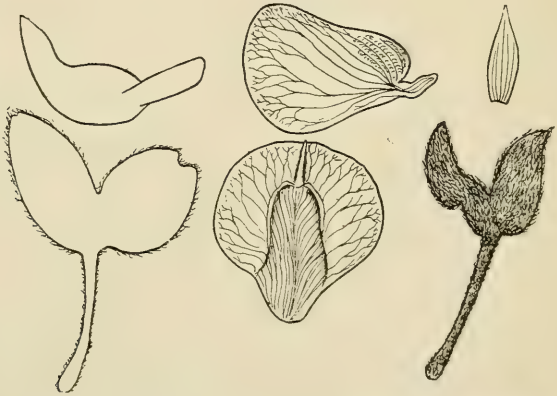


Figure 14. Floral parts of *Lupinus oreganus*, enlarged

The type, in the herbarium of the Nevada Agricultural Experiment Station, is *Heller 10044*, collected May 18, 1910, at Eugene, Lane county, Oregon. The exact station is on the railroad a short distance south of the town near a switch or junction, where the species was growing abundantly on an embankment. It was at first referred to *L. mucronulatus* Howell, and specimens distributed under that name, but further study has shown it to be distinct. That species is locally known only from the mountains of southwestern Oregon.

While *L. oreganus* is related to *L. mucronulatus* and resembles it considerably in leaf form, it is a plant of entirely different habit, being erect instead of decumbent, has longer stems, a much longer raceme, has a notched instead of entire upper calyx lip, and the keel is glabrous instead of ciliate above the middle.

Lupinus pallidipes n. sp.

Perennial (§ *Polyphylli*): stems about 8 dm. high, rather stout, 5 to 7 mm. in diameter, purplish, sparsely hirsute with clear white hairs: leaves rather few, the lower petioles 2.5 dm. long, leaflets about 12, elliptical-lanceolate, acute or short acuminate, 1 dm. long. 18 mm. wide, somewhat appressed hirsute on both faces, dull green above, paler below: stipules 1 cm. long the free portion lanceolate-acuminate, 7 mm. long, hirsute with long white hairs: peduncles short, 5 or 6 cm. long: inflorescence elongated, 2.5 dm., very dense: bracts narrowly lanceolate, acuminate, 1 cm. long, 1.5 mm. wide, early deciduous, slightly exserted beyond the flower buds: pedicels rather slender, 8 mm. long, densely silky sericeous with drab hairs as is also the calyx: calyx lips nearly equal, the upper 8 mm. long, 5 mm. wide when spread out, the apex 2 mm. across, notched; lower lip lanceolate, 9 mm. long, 5 mm. wide at the base, apex entire, narrow and keel-like in nature: flowers brown-red, 13 mm. long, 21 mm. deep, distance between apices of banner and wings 6 mm.: banner with sides turned back, meeting and inrolled, the whole broadly obovate when spread out, 11 mm. across, the face narrow, not over 2 mm. with a shallow and narrow groove 6 mm. long, the base deeply concave ventrally; wings oblong, broadest above the middle, 9 mm., thence gradually curved to the broad rounded apex, 6 mm. wide at base, the dorsal edges closed only near the apex, exposing the keel for nearly its whole length: keel glabrous, strongly falcate, the acute purple tip exserted about 1 mm., 6 mm. deep at the middle: pods and seeds not seen.

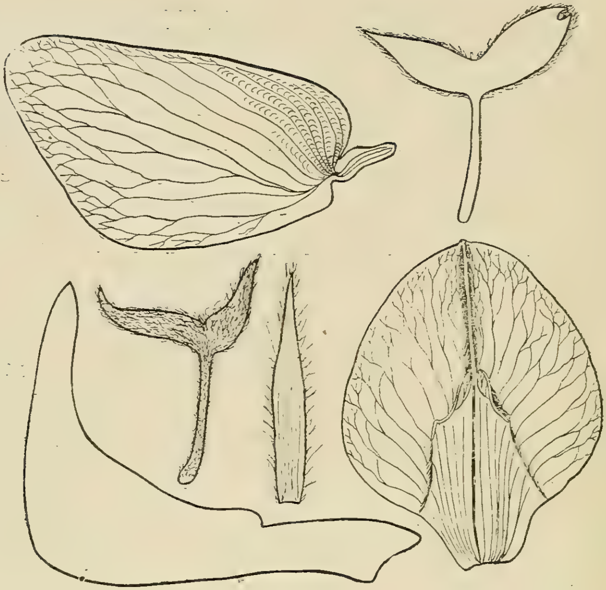


Figure 15. Floral parts of *Lupinus pallidipes*, enlarged.

The type, in the herbarium of the Nevada Agricultural Experiment Station, is *Heller 10041*, collected May 18, 1910, at Eugene, Lane county, Oregon, in moist grassy places along the railroad just south of the town, and only a short distance from the bank where *L. oreganus* was obtained.

This peculiarly colored species was noticed from the car window at several places south of Eugene, always in wet or damp situations. The color of the flowers is most unusual, and may perhaps best be designated as livid red, if such an expression is permissible. When dry, at least in my specimens, this color changes to light brown.

While the species is perhaps local, it may have found its way into some collections under the name of *L. polyphyllus*. It differs first of all from that species in the color of the flowers (*L. polyphyllus* having violet-blue flowers) which are closer, less inclined to be whorled, in the stouter, very sericeous pedicels, the larger calyx with a narrower lower lip and less deeply notched upper one; a banner longer than broad; narrower wings, and a larger, glabrous, more falcate keel, with a longer, more acuminate apex. Several of the plants collected show larger leaves than the type, being 13 cm. long and 3 cm. wide.

Lupinus Pipersmithii n. sp.

Annual (§ *Micranthi*) somewhat pubescent below with white hairs, densely so above, especially in the inflorescence: branches several from the base, 4 dm. high, straw colored, rather prominently ridged: petioles slender, about 5 cm. long or the uppermost somewhat shorter; leaflets about 8, 2 cm. long, 2 mm. wide above, gradually tapering to the base, the apex slightly narrowed and acutish, sparingly appressed pubescent above, more so beneath, light green in color: stipules subulate, green, 6 or 7 mm. long: peduncles 5 cm. long or less, the inflorescence about the same length: flowers in three or four whorls, the internodes except the uppermost longer than the flowers: bracts subulate, 4 mm. long, caducous: mature pedicels 4 mm. long, slender, villous with short white hairs: calyx white villous but the green showing underneath; npper lip 4 mm. long, parted for nearly 3 mm., the lobes lanceolate with a broad V-shaped sinus, the whole broadly ovate when spread out, 4 mm. wide at base; the lower lip oblong, 5 mm. long, 2 mm. wide, 3-toothed at the apex: corollas bright violet blue, 7 mm. long, 5 mm deep, distance between apices of banner and wings less than 2 mm.; banner appearing as if shorter than the wings, the edges turned

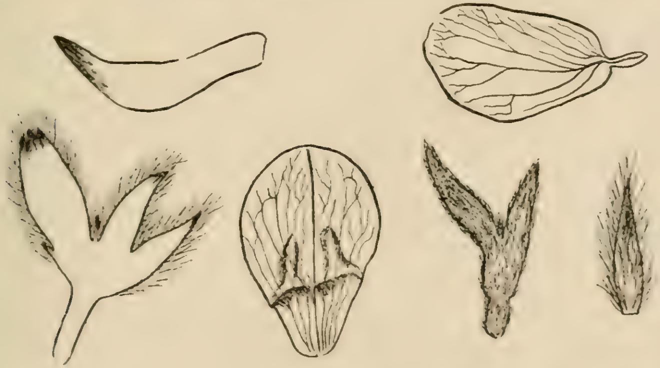


Figure 16. Floral parts of *Lupinus Pipersmithii*, enlarged

back and slightly crinkled above, obovate cuneate when spread out, 6 mm. wide, the face with a shallow groove, at first white at the middle, fading purple or violet; wings inflated, open dorsally and at the apex exposing the keel, the ventral edges closed, raised into a low, sharp keel, the individual wings obovate oblong when spread out, 5 mm. wide just above the middle, then obliquely rounded to the broad blunt apex; keel glabrous, moderately curved, 2 mm. deep across the middle, the apex purple: pods yellowish, villous, 2.5 cm. long, 4 mm. wide, about 7-seeded: seeds pale flesh colored, stightly yellow-brown mottled, 2 mm. long, 1.5 mm. wide.

The type, in the herbarium of A. A. Heller, is *Charles Piper Smith 1403*, collected April 13, 1908, in Cedro Cottage field, San Mateo county, California, near Stanford University.

An account of this species was given by Mr. Smith in this journal **6**: 139. *f. 20*, as "*Lupinus* sp." His illustration is here reproduced as figure 17.

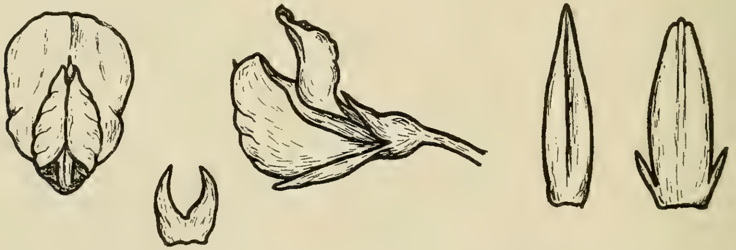


Figure 17. Enlarged flower of *Lupinus Pipersmithii*, natural shape

While but few collections of this plant have been noted, it is no doubt not uncommon about Stanford University, and should be looked for elsewhere. Besides the type I have seen the following: *Heller 10250* (pink), *10251* (blue) *Smith 1402* (pink) from the type station; *Heller 10253*, Stanford University campus near the athletic grounds; *C. F. Baker 1921*, San Andreas lake; Palo Alto, *Tidestrom*, May 12, 1893, *Greene*, April 12, 1895.

It is one of the various species long referred to *L. micranthus*, but as shown in my paper in Muhlenbergia for January of this year, that species is a northern plant, and its nearest relative is *L. polycarpus* Greene, with which this species could not well be confused, even by the most careless observer. To *L. apricus*, though, it bears considerable resemblance, and the two grow in company. But *L. apricus* has a larger flower, the broad banner as well as the whole flower of an entirely different shape, as may be noted by referring to Muhlenbergia **6**: 138, 139.

ALPINE PLANTS—I.

BY P. BEVERIDGE KENNEDY

PHLOX DEJECTA Nelson and Kennedy, Proc. Biol. Soc. Wash. **19**: 37. 1906.

(With cover illustration)

A recent visit to the exhibition of the Royal Horticultural Society in London, and to the Botanic Garden at Kew showed to the writer the unusual interest and enthusiasm displayed in alpine plants by not only professional botanists and horticulturalists, but by hundreds of English ladies and gentlemen, many of them among the nobility. They maintain with the greatest pride and care artificial rockeries with many different alpine plants from all parts of the world. Indeed, the skill displayed by European gardeners in growing so many of these dwarfs in climates and at altitudes so greatly at variance with the natural habitats of the plants is very wonderful.

In order that persons interested in imitating as nearly as possible the conditions and surroundings of some of these alpine plants in their homes, we propose in a series of papers to illustrate and to tell something of the conditions under which they live.

The little Phlox that we have chosen for the first of the series grows abundantly on the summit of Mt. Rose, Washoe county, Nevada, at an elevation of 10800 feet. It is subjected to exceedingly cold and changeable weather, but during the coldest period of winter, reaching several degrees below zero, it is protected by a deep covering of snow. Dotted here and there among the lava rocks where it would be difficult to readily secure a handful of soil, we are attracted by the gray-green cushions forming the foliage. These are usually from about six inches to a foot across, and about the first week in August we find them covered with small snow white blossoms.

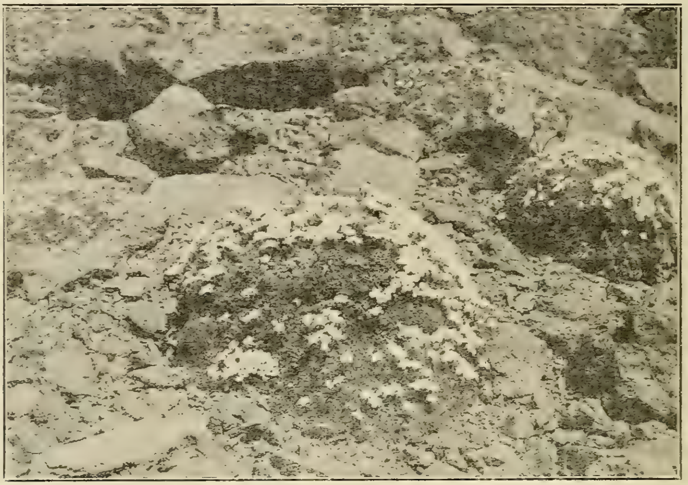


Figure 18. *Phlox dejecta* Nelson and Kennedy

The plant was described as a new species when in all probability Brand's monogroph of the Polemoniaceae for the Pflanzenreich had gone to press, as it is not mentioned in that work. Broadly considered, it would come under *Phlox caespitosa*, and in the division without internodes and with acerose leaves. Brand treats of two varieties with these characters, *condensata* and *Hendersonii.* That it is not the same as the former we feel fairly certain, as that grew near it on the same mountain, and from the figure of the latter on page 82 of the Pflanzenreich, we do not believe that it can be placed with that variety. Whether it is placed as a new species or as a variety of *caespitosa* is of little consequence. What the writer desires to call attention to is that it is the most truly alpine of all the Phloxes, and should be in every collection.

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ANNOUNCEMENT

A new edition of the Catalog of North American Plants is in preparation. Thus far 116 pages have been printed, and other parts will follow as fast as possible. In all there will be about 300 pages. Since a considerable time must elapse before the work can be completed, the 116 pages and other parts as soon as issued, will be sent to those who wish to have them in that form, for $1.25, payment to be sent with the order.

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A. A. Heller,

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Volume 7 Number 9

MUHLENBERGIA

SEPTEMBER, 1911

Editors: A. A. HELLER and P. BEVERIDGE KENNEDY

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University of Nevada,
Reno, Nevada

Volume 7 December 9, 1911

MUHLENBERGIA

STUDIES IN TRIFOLIUM—VI

By P. Beveridge Kennedy

We have not intentionally taken up any species of *Trifolium* for study that occur outside of the limits of the United States, but some Mexican and South American species grow in the United States also, which has necessitated a general knowledge of practically all the clovers on the American continent.

Some collections from Bolivia, all named *T. amabile* H. B. K. attracted our attention as being different from those from Mexico, the type country of that species. Unfortunately the sheets bearing the type collection of the proposed new species have nothing on them to indicate in what part of Bolivia the plants were collected, but they bear the number 2819. Dr. Rusby in working up Mr. Bang's Bolivian collections in the Bulletin of the New York Botanical Garden **4:** No. 14, lists this species on page 343 as *T. amabile*, but gives neither locality nor date of collection. One of the sheets came to me through the herbarium of Parke, Davis & Co., the other from the Missouri Botanical Garden. The plants show characters which would indicate that they had been growing under more favorable conditions of moisture and soil than four more sheets which were collected in the vicinity of La Paz. In these the stems are not so fistulous, the leaves smaller, and the vexillum not so broad, besides other characters that will be noted in the description.

Trifolium bolivianum n. sp.

Root stout, apparently perennial: stems rather weak, several from the crown: leaves obovate-cuneate, the largest 20 mm.

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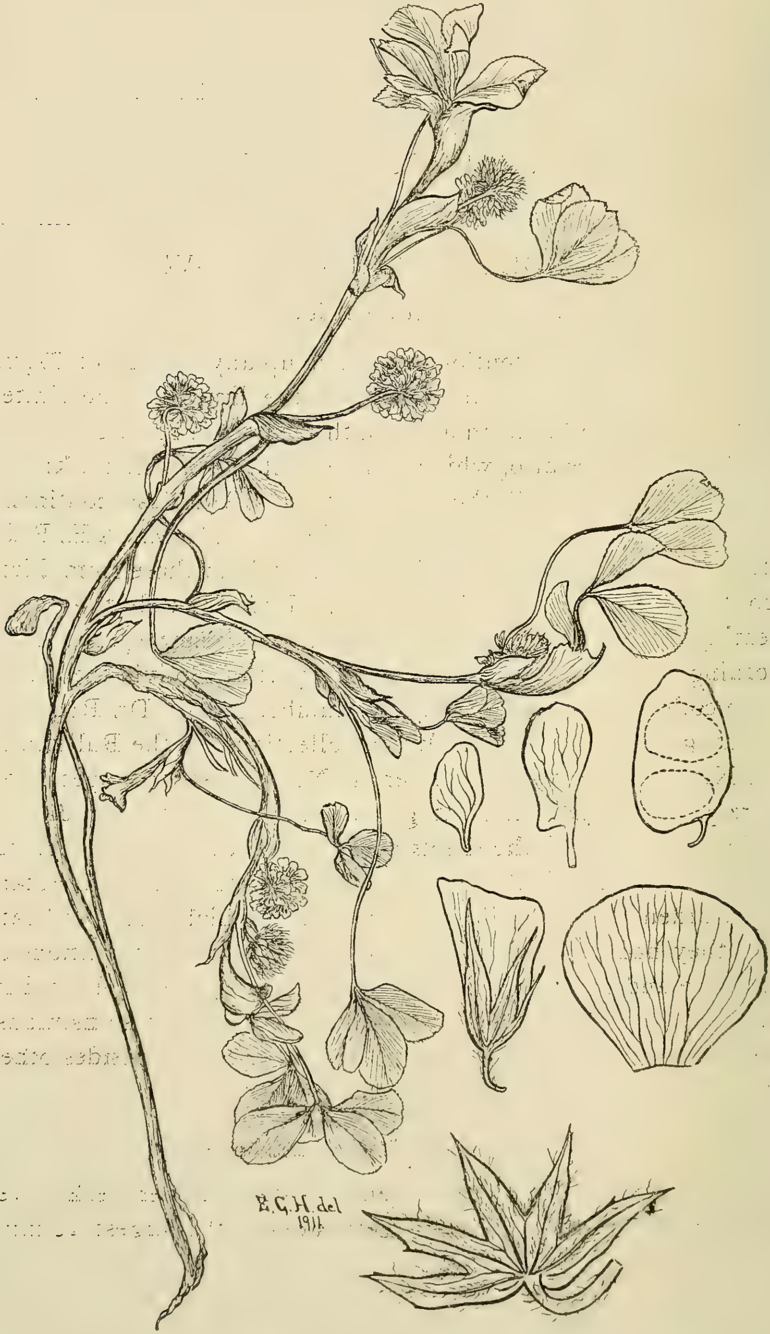
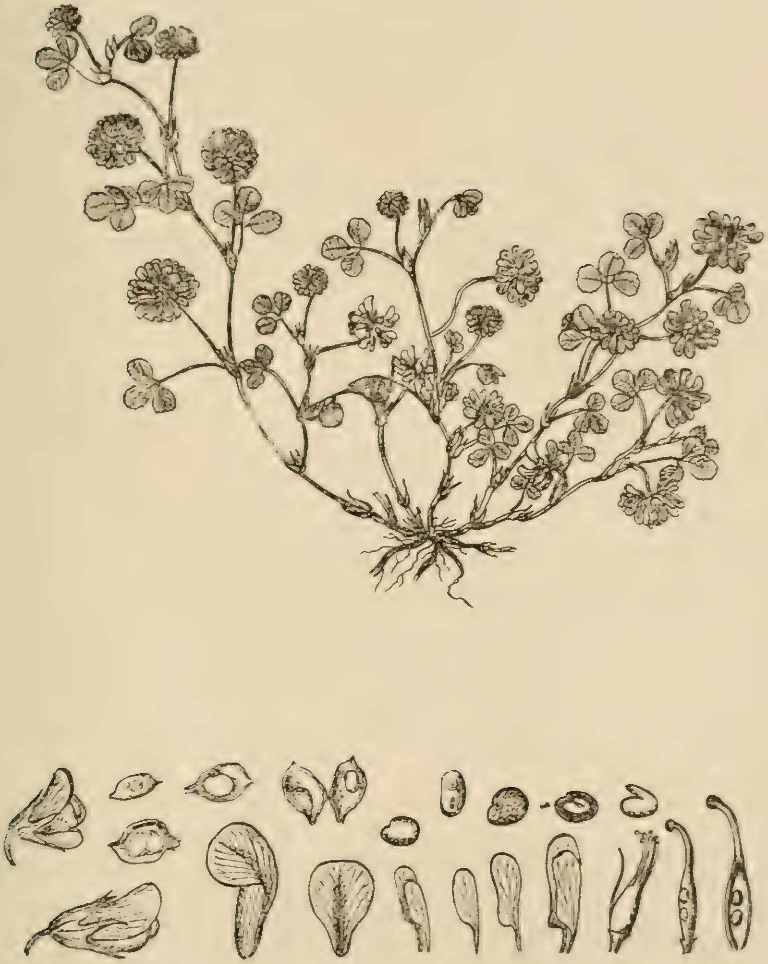
Plate 6



Trifolium bolivianum Kennedy. The parts of the flower enlarged

Plate 7



Trifolium amabile H. B. K. Copied from the original plate.

long, 12 mm. wide, glabrous above and somewhat sparsely hirsute below, margins conspicuously dentate serrate; petioles (in the type) rather long, the longest 6 cm., in specimens from La Paz rather short, the longest 2 cm., all more or less hirsute; lower stipules scarious and linear-lanceolate, the upper ones broadly ovate, somewhat hirsute, adnate to the petiole for one half their length: peduncles (in the type) shorter than the petioles; in the La Paz specimens somewhat longer than the petioles, densely hirsute: heads about 1.5 cm. in diameter, 10 to 20 flowered: pedicels about 3 mm. long, reflexed in age, with numerous small, scarious, subulate bracts at the base: calyx lobes 3 mm. long, broad at the base, margins irregular; tube 2 mm. long, pubescent: corolla extending only slightly beyond the calyx teeth; vexillum very broad, 5 mm. long and as wide; wing blade 2.5 mm. long, claw 1.5 mm. long; keel blade 2 mm. long, claw .5 mm. long: pod oval, one or two seeded: seeds large, rounded, 1.5 mm. long.

The plant belongs in the *amabile* group, but can not be identified with that or any of the more recently described species of House in the Botanical Gazette **41:** 342. 1906.

BOLIVIA: *Bang 2819* (type in the herbarium of Parke, Davis & Co.); near La Paz, 10000 feet, *Bang 191*, 1890, *Rusby 1012*, *1013*, *1015*, April, 1885.

EXPLORATIONS OF WILLIAM LOBB

[The name of Lobb has been made familiar to many botanists by the several species bearing his name, such as the beautiful alpine *Eriogonum Lobbii* and the no less striking *Ribes Lobbii*, but few of us know anything of the man himself. The following welcome sketch has been sent us by Miss Eastwood, now engaged in studying American types located in English herbaria. The sketch is copied from Veitch's Manual of Coniferae, new edition by Adolphus H. Kent, page 243, published in 1900.—EDS.]

"William Lobb (1809-1863) was born in the eastern division of Cornwall. The place is unknown, nor is anything known of his early life. When a young man, he applied himself to gardening, and obtained a situation as gardener to Mr. Stephen Davy, of Redruth, whose horticultural establishment appears to have been on a modest scale, but which, under Lobb's management, became thoroughly efficient. After remaining in the service of Mr. Davy a few years, Lobb entered the nursery of Mr. Veitch, at Exeter, for the purpose of improving his knowledge of plants. For a long time previous he had cherished an ardent desire for travel and adventure; he was quick of observation, ready in resources, and practical in their application; he had also devoted much of his leisure time to the study of botany, in which he had acquired considerable proficiency. Mr. Veitch, finding him thus qualified, proposed that he should go on a mission to South America for the purpose of collecting plants in that rich quarter of the globe, an offer which Lobb gladly accepted. He sailed from Plymouth in 1840 for Rio Janeiro. On his arrival in Brazil he first proceeded to the Orgaos mountains, where he met with several beautiful Orchids at that time extremely rare in English gardens; he then proceeded to Chile by crossing the great Pampas of the Argentine Republic and the Chilean Andes. Continuing his journey southwards he penetrated the great Araucaria forests, where he collected a large quantity of seeds of *Araucaria imbricata;* he was thus instrumental in bringing this remarkable conifer into general use for ornamental planting. He returned to England in 1844, renewed his engagement with Mr. Veitch, and sailed again for Brazil in April of the following year. After sending home from Rio Janeiro a consignment of plants which he had collected in southern Brazil, he proceeded to Valparaiso, for the purpose of exploring southern Chile, at that time but little known to Europeans, except along the coast.

"Here a rich harvest awaited him. Among his earliest successful introductions from this region were *Lapageria rosea*, *Escallonia macrantha*, *Embothrium coccineum*, *Philesia buxifolia* and *Desfontainea spinosa.* Following up these brilliant achievements, he continued his explorations in Valdivia, Chile, and northern Patagonia, where he collected seeds and plants of

Libocedrus tetragona, *Fitzroya patagonica*, *Saxe-Gothoea conspicua*, and *Podocarpus nubigenus*, four most interesting conifers for this country after *Araucaria imbricata*, that South America produces. Nor must mention be omitted of *Berberis Darwinii* which was first introduced by him to British gardens during the same expedition. Lobb returned to England in 1848. The wonderful conifers discovered by Douglas in California and Oregon were then still very scarce in England, and young plants of most of the species could scarcely be bought with money; it was therefore decided that he should proceed to California with a view of obtaining seeds of all the most important kinds known, and to discover others, if possible. He landed at San Francisco in the summer of 1849, and at once made arrangements for exploring southern California. One of the first fruits of the expedition was the successful introduction of *Abies bracteata*. During the years 1850-1851, he sent home consignments of cones and seeds of *Pinus radiata*, *P. muricata*, *P. Sabiniana*, *P. Coulteri*, and *P. tuberculata;* also of many shrubs and flowering plants, some of which were quite new to British gardens. In the autumn of 1851 he extended his operations further north, and collected cones and seeds of the Redwood (*Sequoia sempervirens*), *Pinus Lambertiana*, *P. monticola*, etc. In 1852 he made an excursion to the Columbia river and Oregon where he succeeded in obtaining seeds of *Abietia Douglasii* [*Pseudotsuga mucronata*] and *Abies nobilis*, still rare at that time in England, and the beautiful Thuia provisionally named after him. Returning through north California, he collected seeds of *Abies grandis*, *A. magnifica* which he sent home under the name of *A. amabilis* believing it to be the *A. amabilis* of Douglas, *A. concolor* (var. *Lowiana*) the first received in England of that fine fir, *Juniperus californica*, *Pinus ponderosa*, etc. In 1853 he explored the Sierra Nevada, whither he was led by the reports of the discovery of trees of extraordinary magnitude which he had the good fortune to find, and to secure the first cones and seeds of the Wellingtonia [Sequoia or Big Tree] received in England. He brought these home at the end of the year, and with them two living plants, which were afterwards planted out in the Exeter Nursery where they survived but three or four years. Lobb returned to California in the autumn of 1854, and from that time up to the end of 1856 he continued to send home consignments of plants and seeds. In 1857 his engagement with Mr. Veitch terminated. He remained however, in California, and sent collections of seeds to England from time to time. In 1863 he was siezed with paralysis and lost the use of his limbs; he died at San Francisco in the autumn of the same year and was buried in Lone Mountain Cemetery."

ALPINE PLANTS—II.

BY P. BEVERIDGE KENNEDY

PHLOX DOUGLASII Hook. Fl. Bor. Am. **2**: 73. 1838.

Our illustration shows another of our mountain phloxes at home. It was photographed at an elevation of 10000 feet, and had for its neighbors *Salix petrophila*, *Trifolium monanthum*, *Mimulus implexus*, *Sibbaldia procumbens*, *Elephantella attolens*, and several carices and grasses.

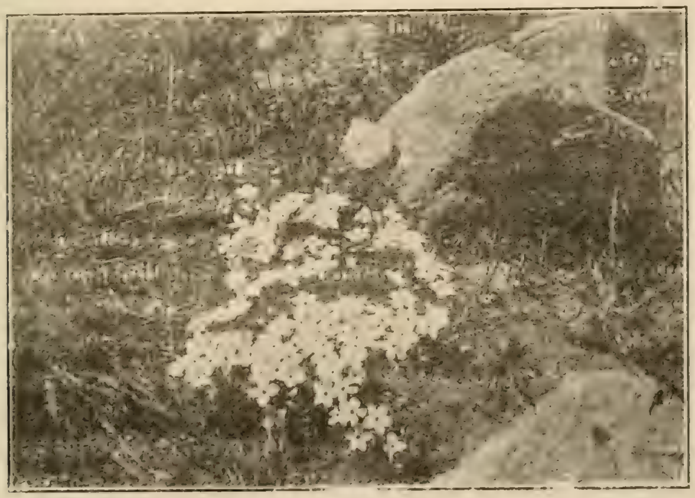


Figure 19. *Phlox Douglasii* Hook.

The plant seems to represent the typical form of *Phlox Douglasii.* It is low, but with loose, much branched prostrate stems and remarkably stout, almost woody roots. The originals were collected by Douglas in the Blue mountains of Oregon, and near snow banks somewhere in the Rocky mountains. The species with its varieties is found throughout the great range of mountains traversing northward through Colorado, Utah, Wyoming, South Dakota, then west through Montana and Idaho to the Cascade range in Oregon and Washington, and extending south through the Sierra Nevada to California and Nevada.

With us it may be found growing at elevations of 6000 to 10000 feet, displaying a profusion of white flowers sometimes delicately tinged with light purple.

THE FLORA OF THE RUBY MOUNTAINS—I

By A. A. Heller

The Ruby mountain range, situated in Nevada about 75 miles west of the Utah line, is about 80 miles long, with a northeast-southwest trend, and as described in the Botany of the King Expedition, "are by far the most stern and alpine of all these ranges, the main peaks between 11,000 and 12,000 feet in height, precipitous and rugged, the deeper canyons evidently scooped out by glaciers, gemmed with snow-fed lakes beneath the peaks, and carrying full streams into the valleys. The southern portion, however, below Fremont's Pass [now known as Harrison pass], is less rugged and of different geological structure, mainly of nearly horizontal strata of limestone. The canyons here, often mere gorges with close precipitous walls, are perfectly dry on the eastern slope, the melting snows sinking almost immediately, but reappearing at the base in bold ice-cold springs. The water from these springs and streams unites to form Ruby and Franklin Lakes, bodies of nearly fresh water, very shallow and largely occupied by a dense growth of the "Tule," (*Scirpus validus*). As usual in these ranges, the western slope is much the more gentle, with a broader line of foothills.

The streams upon this side form the South Fork of the Humboldt. The "Clover Mountains" of the Catalogue form the northern extremity of this range, isolated by a depression known as Secret Valley, but of equal height and similar character."

The average altitude around the base of the range is about 5800 feet, but the land on the east side is apparently a little higher than that on the west. This range as a whole presents probably the highest mountain mass in the state, as nowhere is the crest line much under 9500 feet, and as stated above, numerous peaks run up to 11000 feet and more. While the Clover mountains are uniformly high, the crest being not less than 10000 feet, the highest peaks in the whole range are those near Lamoille, at a point farther south. Many portions carry snow the year round, though there are no true glaciers.

Like most Nevada mountains, the range is not a wide one, probably not over fifteen miles in width anywhere, and considerably narrower at many places.

Two considerable streams flow from the west side, Lamoille creek and the South Fork of the Humboldt, both issuing north of Harrison pass. Besides these, numerous small streams are utilized for irrigating the ranches lying at the foot of the slope.

Below Harrison pass only two streams flow into Ruby valley on the east side of the range, and these issue from caves at the base of the ridge, the larger known as Cave creek. The smaller one appears about two miles below Cave creek, and is diverted from the start into an irrigating ditch.

Here some of the narrow canyons carry intermittent streams during wet weather, and many of them show some trickling water in their upper courses nearly all the year, but owing to the porous nature of the limestone formation, the greater part of the moisture wells out as immense springs many feet across some little distance from the foot of the mountain. Their outlets almost immediately merge with the so-called Ruby lake.

Of the conditions north of Harrison pass on the east side I have no personal knowledge; but understand that the canyons carry streams into Clover valley, as they do on the west side.

The range is not heavily timbered, and at a distance gives the impression of being treeless at most places. About the heads of canyons, especially on north exposures, is found a scattered growth of *Pinus flexilis*, and in some places, as back of Lamoille, it even occurs in fair sized groves. *Pinus Balfouriana* is reported by Watson as growing sparingly on the summit. He also records *Picea Engelmanni*, but that too was not seen by me.

The months of July, August and September, 1868, were spent on and about the Ruby or East Humboldt mountains as they were then called, by Sereno Watson, botanist to the expedition which explored the region designated as the fortieth parallel. From July 11th to August 24th, Fort Ruby, at the extreme southern end of the range, was the base for operations. From August 24th to September 20th, the northern part of the range was explored.

In 1893 and again in 1896, Dr. E. L. Greene spent a few days here, presumably in the Clover mountain part of the range, and occasional references by Marcus E. Jones, indicate that he also has collected there.

Watson collected a large number of types in this region, and Greene has published a number from the same source. Wishing to obtain material of these species from type locality as well as to gain a better botanical knowledge of this part of the state, I was sent thither by the Nevada Agricultural Experiment Station in 1908.

Work was begun on July 17th near Deeth, two weeks being spent at the hospitable ranch of Mr. William Smiley, and from here the northern end of the Clover mountains was visited, as well as the meadows at Deeth and the Humboldt Wells.

Mr. Smiley's ranch lies at the very foot of the Clover mountains about seven miles southeast of Deeth, and varies in altitude from about 5750 to 5900 feet. It is irrigated from a small stream flowing from one of the canyons, and partly surrounded by uncultivated sage brush land. Here is located the only wood lot I have so far seen in Nevada, made up principally of elms, poplars and willows. My tent was pitched within its borders, and it proved to be a very pleasant camping place.

One of the interesting species found within the wood lot was *Castilleja Tweedyi* Rydb., growing along the irrigating ditch. This is an abundant species in the region, and is somewhat variable in leaf form, specimens collected at 9000 feet having narrow lanceolate leaves, while in others they are broadly lanceolate. It is one of the commonest plants of the northern half of the range, occurring at an elevation of 5800 feet in the lowlands along streams, and up to 9000 feet on the ridges, where it is found coloring the borders of thickets on north slopes. These collections considerably increase the range of the species, as it has not heretofore been definitely reported outside of Montana and Wyoming. Specimens were collected as far south as Lamoille. The determinations are by Dr. Rydberg.

Aconitum subcaesium Greene, is another species of great altitudinal range. Dr. Greene originally found it "near the limits of snow in the Clover Mountains," but I encountered it only in a wet place in Mr. Smiley's wood lot, and in a wooded swampy place at Lamoille, both places at an altitude of less than 6000 feet.

The type of *Carex microptera* Mackenzie, was collected in moist gravelly ground on the edge of a hay field at 5900 feet. Mr. Mackenzie has also determined as this species a plant collected early in September, 1910, at an elevation of 9400 feet on a moist gravelly slope adjacent to the peak called "Hole in the Mountain," situated several miles back of the type station.

What appears to be *Thermopsis angustata* Greene, was blooming in wet places along a ditch. This was also plentiful at Lee, on the South Fork of the Humboldt. The plant is practically from type locality, Star valley, but differs from the type in having much larger and broader stipules, only the uppermost ones approaching the description of "small and narrow."

Several hours were spent at the Humboldt Wells near the town of Wells on July 27th. They are situated in a narrow strip of meadow land lying between dry, sage brush covered hills, natural wells with no visible outlet and of uncertain depth. There is marshy ground about some of them, while around others it is firm. Growing in the stiff alkaline soil about the wells was *Pyrrocoma subviscosa* Greene, and *Sisyrinchium halophilum* Greene, both from type locality. Other abundant species were *Ivesia Kingii* and *Ranunculus Purshii.* On the dry hills just north of the wells a few plants of *Eriogonum aridum* Greene, also from type locality, were obtained. Dr. Greene's remark of "peculiar to the arid foothills above the Humboldt Wells in eastern Nevada," is a very fitting description. The hills are hot and dry and arid, and nothing better can be said of them, except that there is a narrow strip of moist meadow land lying between. *Bolelia laeta* Greene, also first collected here was not found, but was plentiful in moist low places at Deeth. Speoimens were also found in 1907 at Sparks, near Reno, 350 miles west of the type station.

The more or less alkaline meadow land along the Humboldt at Deeth is the type locality for a number of Dr. Greene's species, but only two of them were found, *Pentstemon pratensis*, a beautiful white flowered species found in moist meadows for many miles along the base of the range, and *Chrysothamnus consimilis*, plentiful all about the borders of the meadows in moist alkaline places.

A clover, referred for the present to *Trifolium Beckwithii*, was common in one field, comprising at least a third of the hay crop. The stems were very tall and weak for that species, but they had to be tall in order to successfully compete with the timothy and other grasses with which it was growing. This is the plant referred to by Dr. Greene in Pittonia **3**: 222, under *T. Kingii*. *T. Harneyense* Howell, was also found sending its long and thick fleshy roots deep into the stiff soil, but was not so plentiful here as in the valley below Lamoille, where its pale purple heads thickly dotted the meadows.

The beautiful annual *Castilleja exilis* A. Nelson, was found here and there in low moist places, but it seems to be a fairly common plant in northern Nevada, occurring also about Reno. Several asters were found, but none of them answer to the description of *Aster exsul*, collected there by Dr. Greene.

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A. A. Heller,

539 West 5th street, Reno, Nevada

Volume 7 Number 10

MUHLENBERGIA

OCTOBER, 1911

Editors: A. A. HELLER and P. BEVERIDGE KENNEDY

Cassiope Mertensiana (Bong.) Carr.

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The Flora of the Ruby Mountains—II: A. A. Heller 113

University of Nevada,
Reno, Nevada

Volume 7 December 30, 1911

MUHLENBERGIA

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A NEW SPECIES OF PHLOX

By P. Beveridge Kennedy

While looking over the sheets under the cover of *Phlox Douglasii* we discovered that those marked Kennedy and Gooding 82, Mormon mountains, Lincoln county, Nevada, were not that species, and that there were also two different plants on the sheets.

One of them is undoubtedly *P. austromontana* Coville, but the other, after much searching in Brand's monograph of the Polemoniaceae, E. Nelson's Revision of the Genus Phlox, and a reading of all the more recently described species, we were unable to find a place for.

The two plants grew together, were supposed to be but a single species, and were given the same number. They were abundant on the south slopes of the mountains, while *P. Goodingii*, described in Muhlenbergia **3**: 141. 1908, prevailed just over the hill on north slopes. The last mentioned is a broad leaved, extremely glandular plant.

Phlox aciculifolia

A stout-rooted plant with several root-like stems running along the ground, the leafy portion about 8 cm. high: internodes conspicuous, greenish-white, 8 to 10 mm. long: leaves linear, 10 to 15 mm. long, less than 1 mm. wide, with three longitudinal grooves on the upper surface, appearing as if four-ribbed, rough pubescent, especially on the under surface, margins incurved, apex very sharply acicular: calyx tube 4 mm. long, teeth 5 mm. long, minutely and sharply hispid ciliate on the

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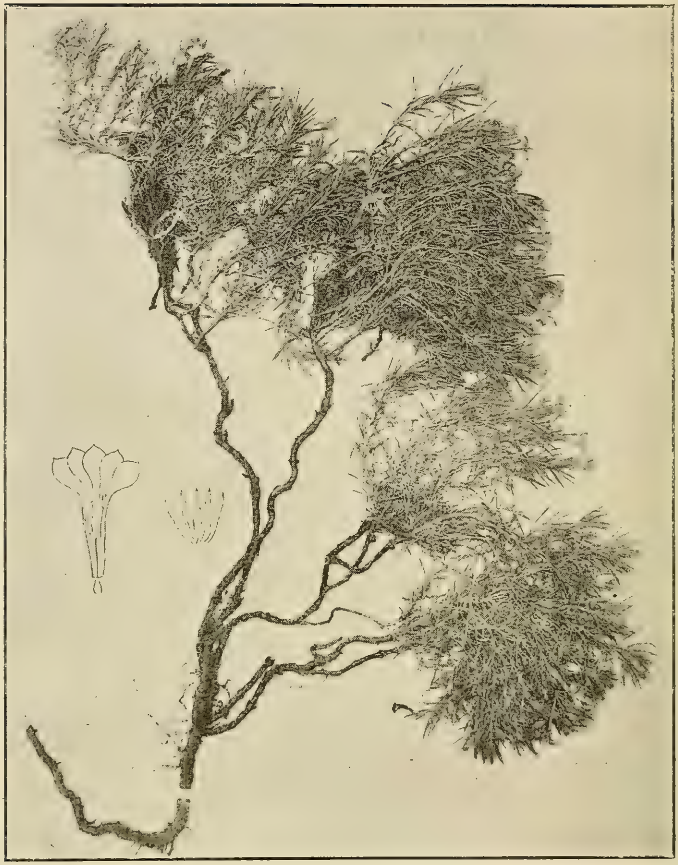
Plate 8



Phlox aciculifolia Kennedy

inner surface, sharply acerose: pedicels short, about 2 mm. long: corollas white, tube about 10 mm. long, extending beyond the calyx teeth about 4 mm., lobes obovate-cuneate, mucronate, about 6 mm. long, 4.5 mm. wide: styles half the length of the corolla tube: capsules not present.

In general appearance it resembles *P. austromontana*, but differs from that species in having narrower leaves, less pubescence, not replicate between the nerves of the calyx tube, the calyx teeth and corolla lobes different.

The type, in the herbarium of the Nevada Agricultural Experiment Station, is sheet *4157*, Mormon mountains, Lincoln county (now Clark county) Nevada, 3000 to 6000 feet, July, 1906 (corrected from field note book to May 24, 1906), *Kennedy and Goodding 82.*

ALPINE PLANTS—III.

By P. Beveridge Kennedy

Cassiope Mertensiana (Bong.) D. Don, Hist. Dichl. Pl. **3:** 829. 1834.

The lover of plants is always glad to meet a member of the heath family, whether on the moors of Scotland, the heaths of England, in our shady pine woods, or as in this particular case, up among the melting snows of the high mountains.

This alpine heather although widespread, is in the localities where it may be found, rather particular as to the place where it makes its home. With us it hibernates beneath dense banks of snow for eight or nine months of the year, appearing at first almost flat with the weight of snow. As soon as the strong but slender stems are relieved of their load they spring up and send forth almost immediately a profusion of rose tinged flower bells. On each side of the ravine in the illustration are boulders, the smaller ones of which it attempts to cover with its somewhat trailing branches. The roots are imbedded in the gravel in the lowest depressions, continuously subjected to the icy water from the melting snow bank above. The matted plants are dense enough to prevent further erosion, and catch for their nourishment the small particles of silt and decayed vegetation.

The exposure is nearly always to the north where the snow is late in melting and indeed often perpetual. It is also well protected from dry hot winds and the summer sun.

From these observations we gather that under artificial conditions a gravel and peat soil among rocks with plenty of moisture, and on the northern side of a rockery, would be most suitable for its successful cultivation. In horticultural literature it is frequently considered under the genus *Andromeda.*

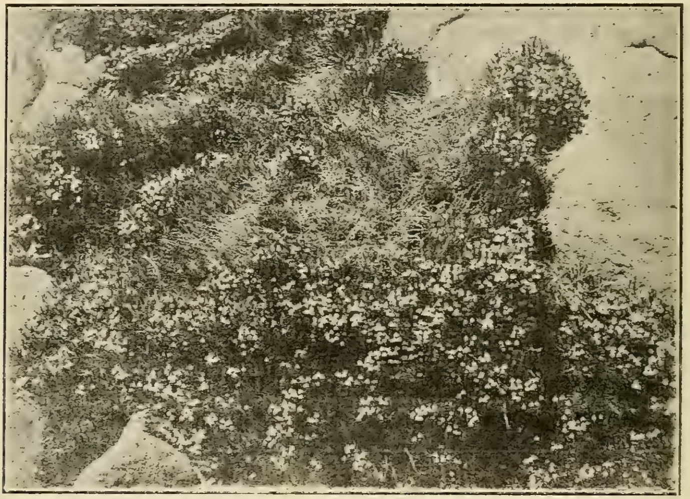


Figure 20. *Cassiope Mertensiana* (Bong.) Carr.

The original plant was collected by Mertens while on a tour around the world, on the island of Sitka, Alaska, at a time when the naturalist was in constant danger owing to the hostile character of the aborigines. It was described by M. Bongard as a new species in a paper entitled "Observationes sur la Vegetation de L'ile de Sitcha," which was read before the Academy of St. Petersburg on May 4, 1831. The date of its publication in the Memoirs of the Academy is August, 1832.

In August, 1907, in the Smithsonian Miscellaneous Collections, Piper has reviewed this species, and finds that the plant varies sufficiently to describe three new varieties. The typical form ranges from Alaska to Oregon, the variety *gracilis* in the mountains of Oregon, Idaho and Montana, the variety *ciliolata* in Siskiyou county, California, and the variety *californica*, which is the one here illustrated, in the Sierra Nevada mountains of California and Nevada at an elevation of from about 7500 to 12000 feet.

THE FLORA OF THE RUBY MOUNTAINS—II

By A. A. Heller

The greater part of the species obtained while located at Mr. Smiley's came from the Clover mountains from a single ridge adjacent to the ranch. This ridge rises gradually from an altitude of 5900 feet to about 9500, where it connects with the central ridge of the system. The main part of it ends at the head of a deep basin, but if one follows around the rim of this large cup-like depression so characteristic of the Ruby range, and continues up to the culminating point on the central ridge, the altitude would be very close to 11000 feet. The highest point attained was about 10500 feet.

The backbone of this lateral ridge faces toward the west, and up to 7000 feet is rather broad and rounded, sloping gradually toward both the north and south, but from this point there is a more decided crest line with a marked change in vegetation between north and south slopes, species on either side ending abruptly at the crest as if checked by an impassable and visible barrier.

The common sage brush, *Artemisia tridentata*, is of course to be reckoned with everywhere up to 8000 or 9000 feet, and is found everywhere on south slopes. At a little under 7000 feet, where the ridge becomes more rugged and less rounded, scattered thickets of aspen, *Populus tremuloides*, begin to appear on the north slope, and are found at intervals up to 9000 feet and more, in some places forming groves of slender saplings 20 to

30 feet high, but more often as dense thickets of shrubs, the stems decumbent at base on account of the weight of snow, and so crowded that it is almost impossible to force a passage among them. Other ridges, notably those about the "Hole in the Mountain," show large unbroken areas of this tree, and there are ridges densely covered with it near Lamoille, providing an excellent cover for the starting of a coniferous forest.

At 6600 feet *Symphoricarpos vaccinoides* begins to appear on the north slope near the crest, and is frequent up to at least 8000 feet. It is a common shrub on the range.

Amelanchier utahensis and *Sericotheca microphylla* were found about an outcrop of rocks at 7300 feet, and the former at least is found at considerably higher elevations.

At the bottom of the basin at the head of the ridge, on the edge of a small lake fed by late-lying snow masses was a clump of *Sambucus microbotrys*.

On the steep east slope overlooking the lake, among scattered trees of *Pinus flexilis*, were clumps of *Ribes montigenum*, and on more rocky places directly over the lake, *Acer diffusum* had a precarious foothold. On the steep north slope above the lake and below snow banks fringing the inner rim of the basin, were tangled masses of *Dasiophora fruticosa*, while a short distance above among the rocks which fringe the edge of the rim were clumps of *Ribes inebrians*, a species common on the range from 6000 up to nearly 10000 feet.

The entire Ruby range has been included in a forest reserve for the past five or six years, and no sheep had been allowed on the Clover mountains for three years previous to my visit. As a conseqence vegetation was in fine condition. Some few cattle and horses are allowed on the reserve, but no damage is done by them.

Below 6600 feet *Homalobus campestris* and *Eriogonum proliferum* were about the only species to be found at this time, the dry slopes presenting little but sage brush. But above this point, on the edge of the north slope, an abundance of species may be found. *Calochortus Nuttallii* is one of them. This species had been a source of perplexity to me for several years.

At first taking the plant from Noble pass, California, as the type, I concluded that it could be none other than the plant so common along the Sierra Nevada with slender, white, sagittate-based anthers, commonly called *C. Leichtlinii.* But an examination last summer in the Torrey Herbarium of Nuttall's *C. luteus*, which should be the type of *C. Nuttallii*, cleared up the matter. This Clover mountain plant, the *C. eurycarpus* of Watson, is the same as Nuttall's, and should pass into synonymy.

Heuchera parvifolia first appeared here. Specimens collected at 9150 feet could not readily be placed by Rydberg's key in North American Flora. To be placed in the proper section one expects to find it under "stamens much shorter than the sepals," whereas it really belongs under "stamens equaling or exceeding the sepals." When the flower is soaked, the stamens are found to be declined, bending in and down toward the pistil, thus appearing as if shorter than the sepals, but they are as long or longer.

At 7450 feet *Pentstemon Watsoni*, a very handsome species, was found, and near it *Alsine Curtisii*, *Phacelia leucophylla*, and *Phacelia idahoensis.* The latter species is shown in the foreground in figure 21.

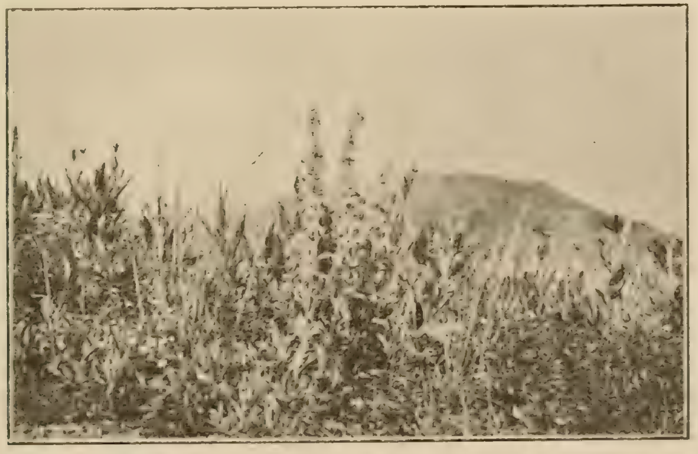


Figure 21. Luxuriant vegetation on the Clover mountains.

From 7300 feet to the head of the ridge there is an abundant growth of grasses and other herbaceous plants of various sorts, as is well shown in the illustration. The soil is loose and well adapted to catch and readily absorb the moisture. Had sheep been allowed on this part of the range, the conditions would be very different. There would be many bare spots with hard soil, from which the water would readily run off.

In open places at 9000 feet where vegetation is rather scattered were found several species of Eriogonum, among them *E. Kingii*, some of the original specimens of which came from the Clover mountains. This is one of the low, tufted species, the erect stems not over two or three inches long, topped by small heads of white or creamy flowers. Some of its companions were *Stenotus acaulis*, *Homalobus tenellus*, *Arenaria aculeata*, *A. uintahensis*, and *Astragalus calycosus*.

One of the most interesting places was the steep north slope of the basin beneath the snowbanks which circled the inner edge of the rim. Here was a wonderful display of bright yellow *Potentilla diversifolia*, *Dasiophora fruticosa*, and *Ranunculus Eschscholtzii*, mingling with the red of *Rhodiola integrifolia* and a very beautiful little Dodecatheon, as yet undetermined.

About the rocks fringing the south rim of the basin was a beautiful assemblage of Erigeron, mixed with *Mertensia lanceolata* and *Ribes inebrians*.

From this point up to the saddle in the crest of the central ridge at 10500 feet, the somewhat drier and stonier slope was covered with a stunted sage brush, clumps of Eriogonum, *Gilia montana*, Dactylophyllum, and *Kentrophyta tegetaria*.

Aconogonum alpinum Schur. Watson lists this under *Polygonum polymorphum* var. *alpinum* as from the "East Humboldt Mountains," "on dry slopes." A few clumps of it were found in moist places on the edge of the small lake in the basin.

Acomastylis sericea, Greene, was first found at 8750 feet on a damp north slope where snow had recently melted, and is from the type locality. The following characters are not mentioned in the original description in Pittonia **3**: 172, as *Geum sericeum:* Calyx teeth triangular, acute, 5 mm. long, 4 mm. wide at base; bractlets lanceolate, 3 mm. long, 1 mm. wide: petals with a very short blunt mucro. The species is plentiful on this ridge up to 10500 feet, at times almost covering the ground. Specimens collected at 9750 feet back of Lamoille differ in that they are more slender, greener, the calyx lobes and bracts narrower, the former longer pointed, and the petals are smaller, darker yellow, and devoid of the blunt mucro. The Lamoille plants are no doubt the same as Watson's 320, listed as a variety of *Geum Rossii.*

Primulus Parryi Gray (*P. mucronata* Greene). Specimens were collected about the rocks at the rim of the basin at 9500 feet. Dr. Greene got his type somewhere in the vicinity. From the specimens at hand I can not separate his *P. mucronata* from *P. Parryi* of Colorado and Wyoming. One sheet shows leaves 2 cm. or less in width, while another bears a plant with leaves 4 cm. wide, with considerable distinction between petiole and blade. Some leaves are acute, while others are blunt. The narrow and deeply cleft calyx segments are well matched in specimens of *P. Parryi* from Rollin's pass, Grand county, Colorado, collected by George E. Osterhout.

Castilleja linoides Gray. Specimens of this were collected at 9000 feet at about its upper limit, on rather dry slopes. It is a common species from 6000 feet up, being very abundant at the foot of the ridge in one of Mr. Smiley's fields, part of which has not been cultivated. At 9000 feet it was less frequent. This species is very rare in herbaria. Except the type and a scrap collected by Jones, I have seen no specimens but my own. It is a handsome species, the whole upper part of the plant orange yellow. The type was collected in the Clover mountains by Watson.

Pentstemon modestus Greene. The type of this was from the "Ruby Mountains back of Deeth." It is apparently the same as Watson's 784 from the Clover mountains, but may not be identical with the West Humboldt mountain plant listed as a form of *P. confertus.* The first specimens were collected at 8750 feet on a moist north slope near a snow bank. The second collection was at 8900 feet in granite in the basin in moist places below the lake. Later it was found at 10500 feet in gravel on the crest of the main ridge, the plants here lower and more tufted. It is a beautiful plant, with bright violet-purple small flowers, the short and broad calyx lobes prominently hyaline.

Arnica chionophila Greene, was collected "near the summits of the Ruby Mountains, Nevada, in the vicinity of perpetual snow, 20 July, 1896," by Dr. Greene. The more exact locality is on the Clover mountains back of Deeth. I have specimens gathered at 9000 feet which are doubtfully referred here. They have two pairs of stem leaves, the upper reduced and usually acute or acuminate, the other on long, more or less winged petioles, either cuneate or somewhat cordate at base, while the basal leaves are semi-cordate. All of the leaves are entire. Not only the peduncles "under the involucre," but the whole stem is "viscidly glandular and villous." The short scattered hairs on the leaves can hardly be called "thinly tomentulose," but there are "small sessile resinous glands on both faces." The involucral bracts are thinly villous rather than "puberulent." While not agreeing very well with *A. chionophila*, it can hardly be referred to *A. cordifolia*.

The following are listed by Watson as occurring in the Clover mountains. The names are not always the same as he employed, but have been made to conform to present usage

- Woodsia scopulina
- Cryptogramma acrostichoides
- Trisetum subspicatum
- Sitanion rigidum
- Festuca brachyphylla
- Poa Fendleriana
  - alpina
- Panicularia aquatica
- Agrostis canina
- Carex affinis
  - frigida
  - leporina
  - scirpoides
- Juncus bufonius
  - Mertensianus
  - Parryi
  - triflorus
- Allium validum
- Calochortus Nuttallii
- Lloydia serotina
- Vagnera amplexicaulis
- Limnorchis dilatata
- Salix reticulata
- Bistorta bistortoides
  - vivipara
- Eriogonum Kingii

Eriogonum umbellatum var.
Polygonum Kelloggii
montanum
Anemone globosa
Aconitum subcaesium
Caltha rotundifolia
Delphinium occidentale
Ranunculus Eschscholtzii
Thalictrum alpinum
Cardamine cordifolia
Thlaspi glaucum
Heuchera cylindrica
Muscaria adscendens
Parnassia fimbriata
Batidaea subcordata
Astragalus calycosus
Kentrophyta tegetaria
Lepargyraea canadensis
Epilobium obcordatum
Ligusticum apiodorum
Kalmia microphylla
Vaccinium caespitosum
Swertia scopulina
Pneumonanthe Parryi
Androsace septentrionalis
Primula Parryi
Phlox caespitosa
Galium triflorum
Arnica cordifolia
Arnica longifolia
Antennaria pulcherrima
Erigeron leiomerus
Eucephalus Engelmanni
Oreastrum Haydeni
Senecio taraxacoides

The following are species collected by me in the Clover mountains and not listed from there by Watson, although he got some of them in the Ruby range proper. In addition to these I have a number that are still undetermined.

Pellaea Breweri
Festuca confinis
ovina
Sitanion minus
Allium acuminatum
Anticlea elegans
Piperia unalaschensis
Aconogonum alpinum
Eriogonum andinum
heracleoides
Porteri
proliferum
Alsine Curtisii
Arenaria aculeata
uintahensis
Smelowskia americana
Sophia incisa
Draba ventosa
Rhodiola integrifolia
Sedum stenopetalum
Heuchera ovalifolia
parvifolia
Ribes inebrians
montigenum
Acomastylis sericea
Dasiophora fruticosa
Potentilla diversifolia
Sericotheca microphylla
Amelanchier utahensis
Acer diffusum

Pyrola minor
Frasera speciosa
Phacelia alpina
  idahoensis
  leucophylla
Batanthes attenuata
Collomia grandiflora
Gilia montana
Castilleja linoides
  Tweedyi
Pentstemon modestus
  Watsoni
Valeriana micrantha
  puberulenta
Sambucus microbotrys
Symphoricarpos vaccinoides
Antennaria reflexa
  rosea
Arnica chionophila
Erigeron compositus
  multifidus
  trifidus
Senecio cymbalarioides
  dispar
  exaltatus
  Purshianus
  rubricaulis
Stenotus acaulis

Arnica denudata Greene, was collected at Deeth, the type locality, but only the variety *canescens* was noted. It is common in meadows in the vicinity.

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A. A. Heller,

539 West 5th street, Reno, Nevada

Volume 7 Number 11

MUHLENBERGIA

NOVEMBER, 1911

Editors: A. A. HELLER and P. BEVERIDGE KENNEDY

Polemonium montrosense A. Nelson

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The Flora of the Ruby Mountains—III: A. A. Heller 125

University of Nevada,
Reno, Nevada

Volume 7 January 25, 1912

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ALPINE PLANTS—IV.

By P. Beveridge Kennedy

Polemonium montrosense A. Nelson, Proc. Biol. Soc. Wash. **18:** 174. 1905.

Since the publication of *Polemonium montrosense* by Professor Nelson from specimens sent to him by us, we have had ample opportunity to study the plant in its natural habitat, and also to take the photograph which we use in our illustratton. The plants sent to Professor Nelson were about one-fourth the size of those here shown, and represent the typical form of the species as it grows fully exposed to the sun and wind, while our illustration represents the plant as it occurs in good soil and well shaded by the rocks. In the former case the orbicular leaflets of the radical leaves are very conspicuous and crowded.

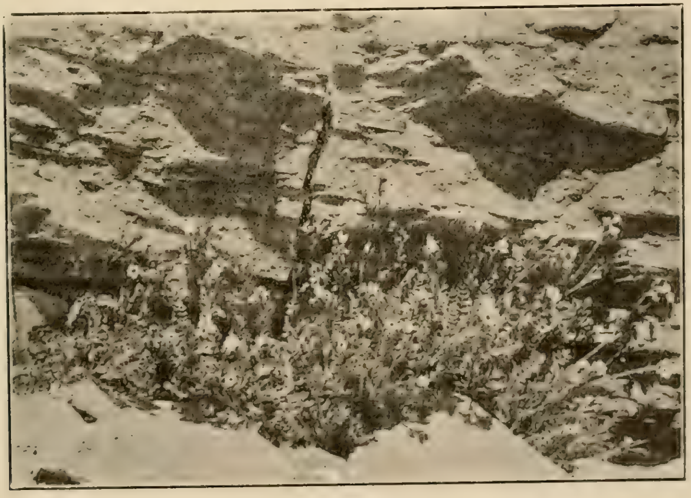

Figure 22. *Polemonium montrosense* A. Nelson

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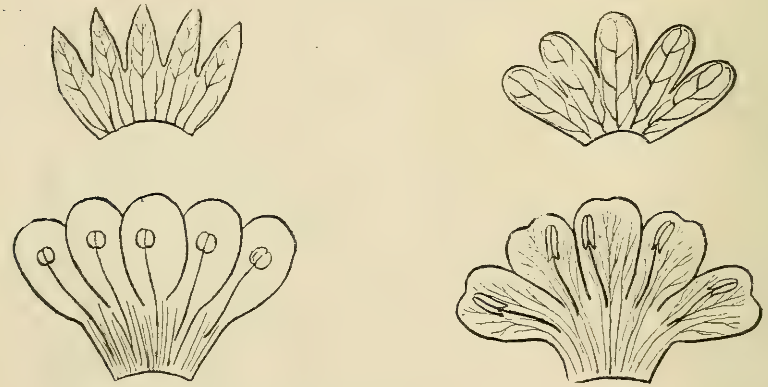
That Professor Nelson ascribed to the plant the character "corolla tube not yellow," is quite excusable, as the plants had been through an herbarium fire, and subjected to intense heat as well as water. All our recent collections have a distinct yellow throat to the corolla. The lobes of the calyx are perhaps better described as elliptical-ovate than ovate. The lobes of the corolla have a blunt notch at the apex. The fruit, which was not present in the type, is 7 mm. long, including the calyx lobes, and densely glandular. The capsule is broadly elliptical, 3 mm. long, 1 mm. wide, with usually two brown, rough, somewhat crescent shaped seeds about 2 mm. long.

Brand, in his monograph of the Polemoniaceae, cites this species among his eight subspecies and varieties of *Polemonium pulcherrimum* Hook., and calls it var. *Haydeni* (Nelson) Brand, with the following synonymy: "*P. Haydeni* Nelson; *P. Tevisii* Eastwood; *P. montrosensis* (*sic*!) A. Nelson."



P. Haydeni Figure 23. *P. montrosense*

As we were fairly certain that the plant is not the same as *P. Haydeni*, from the description, we secured one of the co-types through the kindness of Dr. Wm. Trelease, Director of the Missouri Botanical Garden. An examination of this shows us that *P. Haydeni* is a much larger plant with larger and differently shaped leaves, much larger, differently shaped calyx and corolla lobes, and dissimilar anthers, as may be seen in the accompany-figure.

P. Haydeni was collected in an entirely different region, in Kick Bottoms, Jackson Hole, Snake river, Wyoming, at an elevation of 6000 feet, June 15, 1860, by Dr. Hayden, on Captain Reynold's expedition. Our plant, *P. montrosense*, is an alpine plant, and so far as we know, does not grow below 9500 feet elevation.

There is a probability that *P. montrosense* may prove to be the same as *P. Tevisii*, as the description answers our plant very closely, and it comes from the same general region. At present we do not have access to a specimen or the type of *P. Tevisii*.

So far as we are aware, this beautlful little plant is not yet in cultivation, and from a knowledge of its growth and habitat we feel sure that it is adapted for rockeries, and should be in every collection of alpine plants. The photograph was taken at the type locality, at an elevation of 10800 feet on Mt. Rose, Washoe county, Nevada, where it was growing in the crevices of lava rocks.

NEW COMBINATIONS—V

By A. A. Heller

Capnoides Wetherillii (Eastw.)

Corydalis Wetherillii Eastw. Bull. Torr. Club **29:** 524. 1902.

Radicula hispida (Desv.)

Brachylobus hispidus Desv. Journ. Bot. **3:** 183. 1814.
Nasturtium hispidum DC. Syst. **2:** 201. 1821.
Nasturtium palustre var. *hispidum* Gray, Manual ed. 2, 30. 1856.
Roripa hispida Britton, Mem. Torr. Club **5:** 169. 1894.
Roripa palustris hispida Rydb. Cont. U. S. Nat. Herb. **3:** 149. 1895.
Radicula palustris var. *hispida* Robinson, Rhodora **10:** 32. 1908.

Radicula integra (Rydb.)
Roripa integra Rydb. Bull. Torr. Club **29:** 236. 1902.

Radicula pectinata (A. Nelson)
Roripa pectinata A. Nelson, Proc. Biol. Soc. Wash. **20:** 35. 1907.

Radicula Underwoodii (Rydb.)
Roripa Underwoodii Rydb. Bull. Torr. Club **29:** 235. 1902.

Radicula Williamsii (Britton)
Roripa Williamsii Britton, Bull. N. Y. Bot. Gard. **2:** 171. 1901.

Campe orthoceras (Ledeb.)
Barbarea orthoceras Ledeb. Hort. Dorp. 1824.
Barbarea americana Rydb. Mem. N. Y. Bot. Gard. **1:** 174. 1900.

Campe planisiliqua (C. A. Meyer)
Barbarea planisiliqua C. A. Meyer, in Middendorff, Reise **1:** part 2, 14. 1856.

Campe rivularis (Martr.)
Barbarea rivularis Martr. Pl. Crit. Tarn. **1:** 9. 1862; Fl. Tarn. 44. 1864.

For a discussion of this species see Bicknell, Bull. Torr. Club **37:** 68.

Campe verna (Mill.)
Erysimum vernum Mill. Dict. ed. 8, no. 3. 1768.
Erysimum praecox Smith, Fl. Brit. **2:** 109. 1800.
Barbarea praecox R. Br. in Ait. Hort. Kew. ed. 2, **4:** 109. 1812.

THE FLORA OF THE RUBY MOUNTAINS—III

By A. A. Heller

Having engaged Mr. David Ogilve, with his wagon and team for the month of August, we left Mr. Smiley's ranch on August 3d for Lamoille, some twenty-five or thirty miles farther south. The road in most places lies several miles from the foothills, and is mostly through a dry, sage brush country, with but few plants of interest at this time of the year.

Toward evening we reached the ruins of Fort Halleck, and camped for the night at McIntyre's ranch, about two miles west of the site of the fort. Here a stream comes down from the mountains, and on and near its banks several species were found.

Carex rostrata Stokes, a large species with handsome long and thick yellowish spikes was fairly plentiful in a roadside ditch. Watson reports this with some doubt from Huntington valley, under the name of *C. ampullacea* Good. Huntington valley is in this region, but farther south.

Limnorchis ensifolia Rydb. was also collected with the carex. The type of this came from Mt. Humphrey, Arizona, and apparently has never been reported from Nevada, but several collections have been made in Utah.

Ranunculus eremogenes Greene, was plentiful in wet places along the road. Watson lists this from Ruby valley as *R. sceleratus.*

Ribes aureum Pursh, and *Grossularia inermis* (Rydb.) Coville and Britton, were both rather abundant along the stream. The former was noted at different places during the day, and was also seen between Deeth and Wells. The fruit is either red or yellow. One specimen of the gooseberry shows a decidedly bristly stem, but it is one in which the seasonal growth was considerable. Another one, perfectly smooth, produced only short annual growths.

Parnassia parviflora DC., was also found in fair quantity, its roots in the water. Watson records it from Huntington and Ruby valleys.

Along the roadside was a colony of Hymenoxys, the stems tall, about 6 dm. high, and rather flaccid, with few leaves below. The heads are small, 1 cm. high, and about as wide, the pale yellow rays short and inconspicuous. The involucral bracts are glandular punctate, the inner differing but little in shape from the outer, but are somewhat hyaline. The hairs of the achenes are not ferruginous, and the pappus is a clear bright white.

On the morning of August 4th our road led for a number of miles through the lower end of Lamoille valley, a region of natural meadows and alfalfa fields, some of the meadows more or less alkaline. Careful search in them would no doubt have brought to light many interesting species. As it was, we had to be content with what was visible along the immediate roadside.

Pneumonanthe remota Greene, was fairly common, but was not found at Deeth, the type locality. Watson apparently did not collect this, as his description of *Gentiana affinis* from Ruby, Huntington and Goose Creek valleys does not agree.

A plant referred with considerable doubt to *Veronica Anagallis-aquatica* was plentiful in running streams at two places. The flowers are white, the three upper petals lined with pink at the base, the smaller lower ones unmarked. Our herbarium contains no eastern specimens for comparison, but I am inclined to think that our Nevada plant is different from the eastern one. What we need is a paper on this group of Veronicas with illustrations of flowers and fruit by some one who has access to typical material.

Ibidium strictum (Rydb.) House, was plentiful in grassy meadows, the specimens collected rather taller with larger leaves than in specimens from the Rocky mountains in our herbarium. An undescribed species of *Ivesia* was common in alkaline soil.

Ivesia halophila n. sp.

Perennial (§*Eremicae*), white villous, especially the leaves and inflorescence: stems erect or the outer ones decumbent at base, about 3 dm. high, numerous from a short, erect woody caudex, sparingly leafy: basal leaves rather numerous, 1 to 1.5 dm. long; lower stem leaves about 1 dm. long, the uppermost 5 cm. long; leaflets commonly 3, numerous, loosely imbricated, flat, those of the basal leaves sometimes oblanceolate, rounded at the apex, those of the stem leaves elliptical and acute or acutish, all 1 mm. or more wide, the terminal one 6 or 7 mm. long, the lateral ones about 2 mm. shorter; free portion of the stipules lanceolate, entire, 5 to 7 mm. long, 2 mm. wide at base, the decurrent portion 5 or 6 mm. long: cymes rather narrow with erect branches: pedicels slender, 7 mm. long or less: hypanthium saucer-shaped, 3 mm. across, yellowish: bractlets lanceolate, 1.5 mm. long, .5 mm. wide; sepals lanceolate, barely 4 mm. long, 1 mm. wide: petals white, obovate-orbicular, 4 to 5 mm. long, including the claw of 1 mm., 3 to 4 mm. wide: stamens 10: filaments filiform.

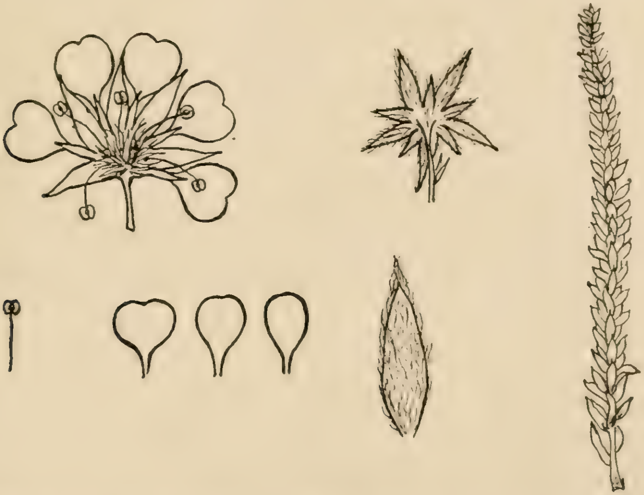


Figure 24. *Ivesia halophila.* Stem leaf natural size; leaflet 4 diameters; calyx, corolla and stamen, 2 diameters.

The type, in the herbarium of the Nevada Agricultural Experiment Station, is *Heller 9261*, collected August 4, 1908, in the lower end of Lamoille valley, Elko county, Nevada. It was plentiful in alkaline soil in a meadow pasture, and was not disturbed by cattle.

This species is perhaps more related to *I. eremica* than to *I. Kingii*, especially in the matter of pubescence. Coville originally described *I. eremica* as "villous-canescent throughout," but Rydberg in N. A. Flora says "finely grayish-puberulent or glabrate." In appearance the plant is more like *I. Kingii*, for the leaves do not "at first sight closely resemble those of *P.*[*otentilla*] *santolinoides*." The leaflets are not "broadly ovate," but either narrowly obovate or elliptical. There were no flowers on the type of *I. eremica*. *I. Kingii* has flowers considerably smaller than are those of *I. halophila*. Rydberg's description of § *Eremicae* on page 286 of N. A. Flora should be revised to read "plants glabrous or villous."

Distegia involucrata (Rich.) Cockerell, in fruit, was common along streams in the meadows, and was also plentiful about Lamoille. A second species of Hymenoxys with much larger bright yellow rays was plentiful in alkaline soil along the road. Like the one mentioned above, it does not seem to agree with any species heretofore reported from Nevada.

On August 5th, work was begun about Lamoille, part of the day being spent along and near Lamoille creek up to the foot of the range, a distance of a mile or more. The creek is a fairly large stream, carrying as much or more water than does the Humboldt at Elko. The following species were collected, the altitude ranging from 6050 to 6250 feet:

Agrostis exarata
Carex aurea
Limnorchis leucostachys
Alsine longipes
Thalictrum Fendleri
Ribes inebrians
Amelanchier oreophila
Trifolium microcephalum
monanthum
Tium alpinum
Chamaenirion latifolium
Epilobium paniculatum
Svida stolonifera
Arctostaphylos Uva-ursi
Phacelia leucophylla
Lappula calycosa
Orthocarpus luteus
Agastache urticaefolia
Galium boreale
Aster adscendens
Tetradymia canescens

Of these, excepting the several recently described species, *Trifolium monanthum*, *Chamaenirion latifolium* and *Phacelia* *leucophylla* are not listed by Watson, unless the latter is included under his *P. circinata*. In addition to these there are several species as yet undetermined, among them an apparently undescribed Arnica.

On August 6th Lamoille canyon was explored, our intention being to penetrate as far as the head of the canyon. But having taken the wrong side of the stream, traveling was very difficult on account of the overgrown condition of the trail, which was sometimes lost altogether, so at 7400 feet, where the canyon forks, we decided to halt. The ridge lying between the forks was ascended to 8200 feet, when the waning afternoon and the close thickets of aspen put an end to further advance. A number of species were collected, the types of which were originally found on the Ruby range.

A single plant of *Delphinium diversifolium* Greene, was found in a grassy thicket at 7050 feet, but two days later it was encountered in fair quantity well up on the ridge north of the canyon at 9750 feet. Dr. Greene probably got his type on the Clover mountains.

Delphinium occidentale Wats., was plentiful in rich soil in and near an aspen forest at 8000 feet, the plants rank and luxuriant. Watson first got it near the southern end of the range, but reports it also from the Clover mountains.

Gormania debilis (Wats.) Britton, occurred at 6800 feet on a moist north slope, in thickets, carpeting the ground in places.

Pentstemon pratensis Greene, was found in a small grassy meadow at 7050 feet, quite an extension of its altitudinal range. But it was not so plentiful as in the meadows at the foot of the range, where it occurs at from 5300 to 5800 feet.

Sphaeromeria cana (D. C. Eaton) Heller, was found sparingly about the cliffs at the fork of the canyon at 7400 feet. The type was collected near the southern end of the range on limestone. Here also was found the curious little *Petrophytum caespitosum* (Nutt.) Rydb., clinging to the rocks. Later it was noted on limestone rocks near Cave Creek.

Antennaria anaphaloides Rydb., was obtained at 8200 feet in rather dry ground on a northerly slope. This is evidently the *A. carpathica* var. *pulcherrima* listed by Watson.

Amarella scopulorum Greene, occurred sparingly at 7100 feet in rich damp soil near the stream. This is apparently the *Gentiana Amarella* of Watson, collected somewhere on the southern part of the range.

The following species not listed by Watson were collected in the canyon:

Bromus Richardsonii
Koeleria macrura
Corallorhiza multiflora
Glycosma occidentalis
Elephantella groenlandica

On August 8th I climbed the ridge paralleling the canyon on the north side, ascending to 10000 feet. The lower part of this ridge, like many of the others, is rather broad, but the sides soon become quite steep, and toward the summit the south side is very precipitous.

From about 7000 to 8500 feet *Cercocarpus ledifolius* is common, usually a good sized tree, the trunk nearly a foot in diameter. From this point south to the end of the range it is one of the features of the drier slopes.

Up to 8900 feet the formation is slate, shale, or some form of volcanic rock, and at 8700 feet where the small fragments of stone were closely packed and not much disintegrated, allowing but little vegetation, *Eriogonum Kingii*, *Phoenicaulis Menziesii*, and a Selaginella were found. Just above 8900 feet granite was entered and continued up to at least 9200 feet, the highest elevation in that formation from which I have collections.

My way led along the north slope, always below the crest after an altitude of 8700 feet was reached, nor did I again touch it until 9750 feet was attained, following it from that point up to 10000 feet. Here, at about 9700 feet one of the best groves of *Pinus flexilis* was encountered, the trees growing larger than at any other place, so far as observed.

Physaria acutifolia Rydb., was collected at 8900 feet in granitic detritus, where there was but little vegetation. This is probably the *P. didymocarpa* of Watson.

A plant referred to *Cartiera arguta* Greene, was found sparingly at 9000 feet on cliffs. It is no doubt the *Streptanthus cordatus* of Watson's list.

A handsome white flowered Polemonium, referred doubtfully by Dr. Rydberg to *P. flavum* Greene, was found in granite at 9200 feet. He remarks that the leaflets are broader and the inflorescence more open than is usual in that species, and this station is considerably outside of its known range, which is Arizona and New Mexico. It is undoubtedly the *P. foliosissimum* of Watson, but does not altogether agree with that or any other species, so far as I have been able to study it.

A descent to 8950 feet to a low place in search of water led to fine collecting ground. There was no surface water, but the ground was moist, and among the clumps of *Salix glaucops glabrescens* was a variety of plants, both annual and perennial. Here, still in the granite, were *Delphinium diversifolium*, the *D. depauperatum* of Watson, a little Oreobroma, no doubt *O. pygmaea*, a small Polygonum referred to *P. unifolium*, a minute Mimulus, still undetermined, with small, pale purplish flowers, and near by an equally small as well as perplexing one with yellow flowers. The one is very glandular, the other nearly smooth. *Carex festiva*, *C. heteroneura* and *C. Hoodii* were growing in close proximity in the rich loose soil, while near by was *Arabis philonipha*, and a Mertensia referred to *M. ciliata* Dr. Rydberg.

At 9750 feet, just above the granite, in places where the melting snow banks in their downward movement had formed patches of moist loose soil, the less sericeous and more slender form of *Acomastylis sericea* was plentiful, and near at hand, often sheltered by a large stone or rock, the reddish tufts of the now familiar *Oxyria digyna*, found all over the country at alpine heights. On the steep slope above, leading up to the crest, was *Festuca calligera*, and on the crest itself, among rocks, *Symphoricarpos vaccinoides*, while close by were masses of an unknown Pentstemon, the violet flowers large and showy. This ridge yielded the following species not mentioned by Watson:

Festuca calligera
Carex heteroneura
  Hoodii
Salix glaucops var.
Phoenicaulis Menziesii
Mertensia ciliata

On August 9th camp was moved to the ranch of Mr. Peter Ogilvie, near Lee post office, on the South Fork of the Humboldt, where some two weeks were spent. Here there is a fertile valley, given over to hay ranches, many of them containing a section of land, and some more. Hay making with these ranchers is not the simple operation of only a few days as with the small farmer whose total acreage is often less than one hay field belonging to a Nevada rancher. The cutting of the hay crop extends over a period of from two to six weeks, depending upon the acreage. Practically all of the hay is stacked in the field and used from there as required, much of it being fed to stock in the winter time when the meadow pastures and the open ranges do not supply a sufficient amount of food.

The South Fork of the Humboldt is formed by four or five streams which head high up in the range in large canyons, whose heads are in basins at usually about 9500 feet, nearly all of them with one or more small lakes, the streams fringed with clumps of low willows, or running through open grassy meadows decked with a profusion of blossoms of every hue, while above tower grim and forbidding cliffs.

About Lee the native cottonwood, *Populus angustifolia*, was common, often a tree thirty or forty feet high, with a trunk a foot or more in diameter.

Numerous clumps of tall willows, many of them three or four inches in diameter fringed the stream banks. Among them were *Salix exigua*, *S. Fendleriana*, *S. macrocarpa*, and *S. perrostrata*.

Crataegus rivularis with well formed but green fruit was common in the meadow where we were camped, and several trees were growing about the tent. Here it is a tree about fifteen feet high, with a trunk five or six inches in diameter, and a symmetrical, well rounded crown.

In moist places in the open meadows *Iris missouriensis* and *Thermopsis angustata* were both plentiful, yielding ripe seeds for our seed collection.

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ANNOUNCEMENT

A new edition of the Catalog of North American Plants is in preparation. Thus far 140 pages have been printed, and other parts will follow as fast as possible. In all there will be about 300 pages. Since a considerable time must elapse before the work can be completed, the 140 pages and other parts as soon as issued, will be sent to those who wish to have them in that form, for $1.25, payment to be sent with the order.

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Volume 7 Number 12

MUHLENBERGIA

DECEMBER, 1911

Editors: A. A. HELLER and P. BEVERIDGE KENNEDY

Salix caespitosa Kennedy. Staminate plants

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University of Nevada,
Reno, Nevada

Volume 7 February 15, 1912

MUHLENBERGIA

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ALPINE PLANTS—V.

By P. Beveridge Kennedy

A new Willow

Many botanists who no doubt are familiar with the names of some of the arctic and alpine willows in botanical literature, may be glad of the opportunity to see a photograph of one of the group in its natural habitat. The photographs were taken in August, 1909, on the northwest side of Mt. Rose, Washoe county, Nevada, at an altitude of about 10000 feet.

The melting snow as it comes through and over the rocks in the nature of a spring, brings with it particles of sand and vegetation, which form a very shallow layer of soil on a flat area a little to one side of the main force of the stream. On this the willow branches adhere like ivy, rooting at every joint and interlaced so as to form a dense mat. From these, erect leafy shoots one or two inches high appear, with the many flowered catkins extending above the foliage. The pistillate plants occupy separate but adjacent areas to the staminate ones.

Whether the mass has increased from a number of distinct plants or from one or two, it is impossible to determine. Although producing an abundance of seed, there is no evidence that it propagates itself in this manner. No plants are found below it in the prevailing direction of the wind.

Rydberg, in his paper on "Caespitose Willows of Arctic America and the Rocky Mountains," in the Bulletin of the New York Botanical Garden **1:** 257, treats of twenty-four species We have considered this Mt. Rose willow as *Salix petrophil* Rydb., but in the first place it differs in having leaves *elliptica* and *acuminate* at both ends instead of "obovate." *S. saximontana* Rydb. is another alpine species found in the state, but

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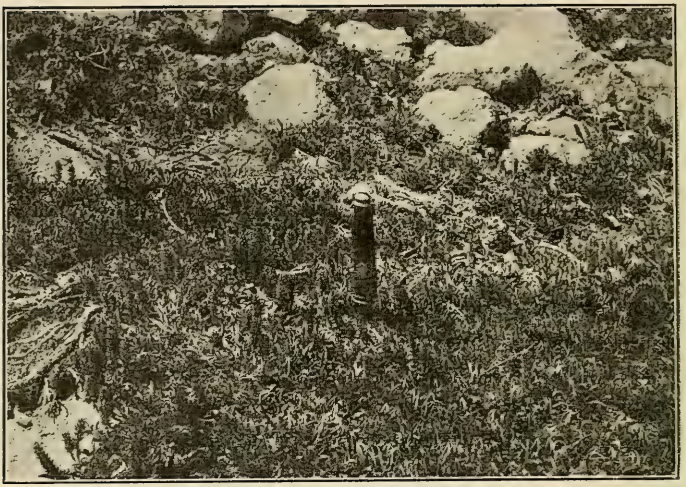
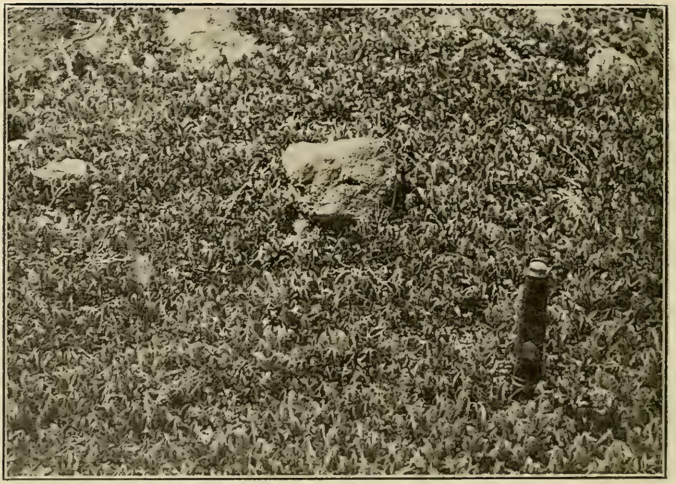
Plate 9



Salix caespitosa Kennedy. Pistillate plants.



Salix caespitosa Kennedy. Staminate plants quite distinct from the Mt. Rose plant. Heller collected it in the Ruby or East Humboldt mountains in August, 1908. In this the leaves are *oblong* or *elliptical oblong* and *acutish* at both ends, green above, glaucous beneath. The stigma is nearly sessile.

Jepson, in his Flora of California 345, evidently considers *S. petrophila* as a synonym of *S. tenera* Anders. He ascribes the character "densely flowered" to the catkins, while Rydberg, both in his key and in the description, has catkins "few flowered." By few flowered we understand such species as *S. nivalis* Hook., illustrated in Nuttall's North American Sylva *pl. 19*, along with *S. lutea*, but the former is not separated by name from the latter on the plate. Here we have seven flowers.

Our plant is densely flowered; that is, it has 40 to 50 flowers. The leaves are all densely pubescent above, at least until the catkins are mature. Beyond that we have no knowledge. Coulter and Nelson in New Manual of Rocky Mountain Botany 136, describe *S. petrophila* as having glabrate or glabrous leaves. Rydberg in his key uses "leaves glabrous, or when young covered with long white hairs parallel to the midrib, in age generally glabrate." In Howell's Flora of Northwest America no mention is made of any pubescence on the leaves.

If the species in literature have been accurately keyed and described, then our plant shows characters sufficiently different for us to propose it as a new species. It may be described as follows:

Salix caespitosa n. sp.

Densely caespitose: branches interlacing, leafy shoots 2 to 4 cm. long: leaves elliptical and acuminate at both ends, light gray-green above and beneath, upper surface densely pilose, lower sparsely so, blade 18 mm. long, 8 mm. wide, petiole 3 mm. long: pistillate flower catkins extending beyond the leaves, 40 to 50 flowered, 2 to 3 cm. long, scale brown, minute, 1.2 mm. long, 1 mm. wide, obovate-cuneate, tuft of long hairs at apex; capsule 5 mm. long, densely silky; style 1 mm. long, stigmas bifid, divaricate: staminate flower catkins shorter, 1.5 to 2 cm.

long, scale reddish brown, 2 mm. long, 2 mm. wide, rounded at apex; stamens 2, filaments 4 mm. long, anthers 7 mm. long: seed dark brown, 1 mm. long, 4 mm. wide, flat at apex, pappus forming a ring and falling back over the seed like a parachute.

The type, which is deposited in the Nevada Agricultural Experiment Station herbarium, was collected on Mt. Rose, Washoe county, Nevada, August 17, 1905, *Kennedy 1173*.

NOTES FROM NORTHERN UTAH—IV

BY C. P. SMITH

VIOLA BECKWITHII **cachensis** n. var.

Petalis superioribus purpureis-violaceis, petalo inferiorique petalis lateralibus albis puris, unguibus flaventibusque purpureis-striatis.

Upper petals violet-purple, lower and lateral petals *pure white*, the claws yellow and purple-veined as in the species. Otherwise with the characters of true *Beckwithii.*

This is evidently the northern Utah and southern Idaho representative of the "bird-foot violet" group, and seems to be unrecognized as a definite form. Twice or more has it been determined for me as *V. Beckwithii*, but as the color difference is very marked and constant, to me it appeals as well worthy of a name.

As to variations in the color of the lower petals of *V. Beckwithii*, I have found but one reference in literature, where M. E. Jones (**4**) describes a white-petaled form from Weiser, Idaho. This is, however, presumably referable to the variety named above. The original description (**1**) of *V. Beckwithii* says, "lower petal barely saccate at the base, purple, with yellow claws, the upper shorter and deep violet." Heller (**5**), who knows the species as it grows at Reno, Nevada, has written, "upper petals deep purple, lower ones much paler." Garrett (**6**), who presumably knows the plant in the field, about Salt Lake City, follows the original description without reference to any variation. I have before me specimens of two collections of true *Beckwithii*, one from Salt Lake City, *Mrs. Joseph Clemens*, the other from Reno, Nevada, *Heller 9981*. These agree in color characters, and have the lower petals much paler than the deep violet upper ones; but indeed far from being white. I am confident that further field study will substantiate my conclusion that the white petaled northern form is no mere variation without fixed color characters.

The variety *cachensis* is common on sage brush covered gravels in the southern end of Cache valley, Utah, and evidently occurs northward and westward over much of northern Utah and southern Idaho. According to reports of my students, it is found as far south as Brigham City, Utah, and I have seen specimens from southern Idaho, north of the Snake river, tho such are not at hand for definite recording. My own collections of it are:

UTAH: *2084*, Logan, Cache county, 6 April, 1910; *2102*, Wellsville, Cache county, 15 April, 1910; *2353*, Collinston, Box Elder county, 1 May, 1911.

TRAGOPOGON PORRIFOLIUS LUTEUS Fr.? On my first visit to Preston, Idaho, in July, 1909, a Tragopogon was very common and conspicuous in full fruit. It looked so much like *T. porrifolius*, which is not uncommon about Logan, twenty miles southward, that I unhesitatingly passed it by as such. I was therefore much surprised, in June, 1910, to find the plant uniformly with bright yellow ligules, tho otherwise with the floral characters of the purple flowered species, and not possibly confusable with *T. pratensis*, the only yellow flowered form reported from North America as yet. I was unable to properly care for the material collected at the time, so that good specimens were not obtained. The determination is, of course, but tentative, and was suggested to me by Mr. H. H. Bartlett, without specimens to consider; but the plant is so like our common *T. porrifolius* that it might well be considered a color variety of the same, at least until its exact relationship can be learned. It is, of course, an introduction from Europe.

MALVASTRUM MUNROANUM (Dougl.) Gray. Botanists today are generally classifying this plant as a Sphaeralcea; but I am still, after much thought, reluctant to consider this species, *M. coccineum* and their nearest relatives, as anything but congeneric. I have examined plants about Logan, Utah, and may say that most of them are strictly 1-seeded, only a very few showing evidence of the empty terminal cell, a few also being 2-seeded—small basis, it seems to me, for placing such closely related plants as these in two different genera. To follow Watson (**2**), and call the 1-seeded specimens *M. Muuroanum* and the few 2-seeded ones *Sphaeralcea Emoryi* is also quite unsatisfactory. That Watson, however, was not altogether satisfied with such an arrangement, is shown by his record. In commenting on *S. Emoryi* he says: "It is so frequently the case that the carpels are 1-seeded, without trace of the other ovule, that it is sometimes difficult to distinguish this species from the last [*M. Munroanum*]. It may indeed be doubted that they are not one." Rothrock (**3**), under *M. Munroanum*, refers to Watson's discussion, quoted in part above, and under *S. Emoryi* he adds: "In Benth. and Hook. Genera Plantarum, we find Malvastrum and Sphaeralcea in different sub-tribes, and separated by eleven interpolated genera, yet . . it may well be doubted as to whether the genera should not (in part at least) be thrown together."

The placing of *M. Munroanum* in Sphaeralcea may seem wholly justified, in consideration of its close relationship to *S. Emoryi*, but such treatment separates it generically from *M. coccineum*, a separation that I cannot accept without protest.

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(**1**) Torrey and Gray, Pac. R. R. Rep. **2**: 119. 1855.
(**2**) Watson, S., Bot. King Exp. 47-48. 1871.
(**3**) Rothrock, J. T., Bot. Wheeler Exp. 74, 76. 1878.
(**4**) Jones, M. E., Cont. West. Bot. **9**: 48-49. 1900.
(**5**) Heller, A. A., Muhlenbergia **6**: 41. 1910.
(**6**) Garrett, A. O., Spring Fl. Wasatch Reg. 60. 1911.

Cornell University, Ithaca, N. Y.

NEW COMBINATIONS—VI

By A. A. Heller

✓ **Batrachium pantothrix** (Brot.)
Ranunculus pantothrix Brot. Fl. Lusit. **2:** 375. 1804.
Ranunculus trichophyllus Chaix.; Vill. Fl. Dauph. **1:** 335. 1786; *nom. nud.*
Batrachium trichophyllum Bossch, Prodr. Fl. Bat. 5. 1850.
(*Ranunculus aquatilis* var. *trichophyllus* Gray, Man. ed. 5, 40. 1867.
Batrachium aquatile var. *pantothrix* Piper, Cont. U. S. Nat. Herb. **11:** 270. 1906.

✓ **Odostemon haematocarpus** (Wooton)
Berberis haematocarpa Wooton, Bull. Torr. Club, **24:** 304. 1897.

✓ **Odostemon pumilus** (Greene)
Berberis pumila Greene, Pittonia **2:** 161. 1891.

✓ **Odostemon Swazeyi** (Buckley)
Berberis Swazeyi Buckley, in Young, Fl. Texas 152.

✓ **Odostemon trifoliolatus** (Moricand)
Berberis trifoliolata Moricand, Pl. Nouv. Am. 113. *pl. 69.* 1833-46.

Odostemon Wilcoxii (Kearney)
Berberis Wilcoxii Kearney, Trans. N. Y. Acad. **14:** 23. 1894.

Anisolotus denticulatus (Drew)
Hosackia denticulata Drew, Bull. Torr. Club **16:** 151. 1889.
Lotus denticulatus Greene, Pittonia **2:** 139. 1890.

Anisolotus rubellus (Nutt.)
Hosackia rubella Nutt.; T. & G. Fl. N. A. **1:** 326. 1838.
Lotus rubellus Greene, Pittonia **2:** 141. 1890.

Anisolotus nudiflorus (Nutt.)
Hosackia nudiflora Nutt.; T. & G. Fl. N. A. **1:** 326. 1838.
Lotus nudiflorus Greene, Pittonia **2:** 141. 1890.

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Mimulus implexus Greene

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STUDIES IN THE GENUS ERYTHROCOMA Greene—I.

By C. P. Smith

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Introduction.—In June, 1909, I collected a plant of striking characters, new to me, on the hillsides above Cache Junction, Utah. The plant was in full fruit, and the prominent, plumose, persistent styles led me readily to determine it as *Geum ciliatum* Pursh, as treated in the meager literature then at hand. The flowers present seemed withered and belated, so caused me no concern, and no critical study of the material seemed necessary.

On May 1, 1911, while making a trip over the same hills, the plant was again secured, at this date being mostly in bud, but with sufficient material in full flower to make a satisfactory

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collection. It was then noticed, with surprise, that the petals were really yellow, more or less red-veined and margined, not at all "purplish," as I had expected from the book descriptions. This observation led me into a more careful study of the plant, and later, upon examining critically my specimens of 1909, I was much surprised to find that the plumose styles were positively, tho inconspicuously, bent and jointed, much after the manner of *Geum* proper. As this character would seemingly disqualify my plant as a member of the genus *Sieversia*, of authors, I concluded that it was unknown to science, in fact, a worthy connecting link between the *Sieversia* species and typical *Geum.* A description was accordingly prepared and included in my notes for a paper then about ready for publication. Happily, however, I learned of Dr. Greene's recent paper (**12**) on *Sieversia* segregates in time to prevent the publication of my description and name; and so the matter has rested until the present time.

Recently, access was had to Greene's paper referred to above, and tho I felt sure that my plant must be accounted for in such an assemblage of described forms, I was unable to make a satisfactory determination. As Dr. Greene made no mention of variations as to the "unjointed" character of the style, and as I had observed decided variations in this respect amongst the plants in the *Geum ciliatum* and *G. triflorum* covers in the herbarium of Cornell University, my interest in the matter was again aroused, and opportunity was sought to investigate the real status of the variations observed.

Material examined.—Thru the kindness of Professors Whetzel and Rowlee of Cornell University, and of Dr. Rose and the authorities of the U. S. National Museum, there are now before me some 150 specimens of the genus *Erythrocoma* Greene, 130 specimens, including 20 type sheets, from the National Herbarium, and some 20 specimens from the herbarium of Cornell University. With this material before me, I am able to come to some conclusions which may be of interest to various students of systematic botany, especially as my conclusions are based upon much of the material considered by Dr. Greene, excepting, particularly, that of his private herbarium.

Hypotheses adopted.—*Geum ciliatum* was made known to science by Pursh (**1**) in 1814. Subsequently, in the supplement at the end of the same work (**2**: 736), he described *G. triflorum*. Comparison of the original descriptions furnishes little to show that the two are different, or one and the same species; but nevertheless the descriptions are sufficient to make me feel, as presumably did Dr. Greene, that real representatives of Pursh's species are in this collection, tho his type specimens have not been seen.

For purposes of this study, therefore, it is assumed that these two species of Pursh, as well as all of Greene's segregates, are valid species, and I have accordingly followed the late classification of Greene (**12**) in laying out the material for study and in recording most of my observations. Each sheet of specimens was handled separately and with care, a good hand lens being used whenever styles were present. Tabulations were accordingly made, especially as to style characters and color of the petals, and such drawings made as seemed advisable.

Characters of the style.—The genus *Sieversia* was established by Willdenow about a hundred years since, and soon Pursh's *Geum ciliatum* and *G. triflorum* were transferred to it by European botanists. Altho *Sieversia* has not been allowed generic rank by American authors until recently, it was accepted by Gray, at least as early as 1856 (**5**), as a section of *Geum*, the section being there characterized, in part, as follows: "Styles not jointed, wholly persistent and straight;" and this is the treatment, to-day, in the latest edition of the Gray manuals (**15**). Also, in the Flore Canadienne (**7**) I find: "Styles non articules et persistant en entier. Sieversia R. Br.;" and in Britton and Brown (**10**): "Style . . strongly plumose throughout in fruit, not jointed." This, however, applied specifically to *G. ciliatum*.

But in 1899 Dr. Greene (**11**) reclaimed for *Sieversia* generic rank, and from him I now quote: "The essential characters of *Sieversia* as distinguished from *Geum* are those of its style; this organ here being straight, continuous without articulation or bend, and in fruit wholly persistent and plumose; whereas in *Geum* it is short, stiff, jointed and bent at or near the middle, the upper portion eventually falling away."

Piper (**13**), Rydberg (**14**), and Nelson (**16**) have accepted *Sieversia* as a genus, and in their generic keys all use the main characters of the style emphasized by Greene, as quoted above.

Now let us see what may be shown by my study of the material at hand, beginning with *E. ciliata* and taking each form in turn.

E. ciliata: 79 specimens, 45 in fruit, of which 33 (73 and a third per cent.) are decidedly hooked, bent, or articulated, 6 not distinctly so (summing 86⅔ per cent. evidently so), 2 probably not so, 4 evidently not so, and 23 (50 per cent.) with pronounced evidence of the deciduousness of the portion beyond the joint or bend.

E. ciliata ornata: 3 specimens, none in fruit, hence can not be judged as to the style.

E. dissecta: 12 specimens, only 4 in fruit, 1 evidently jointed, 1 evidently unjointed, and 2 difficult of classification, but 1 of these with missing tips.

E flavula: 2 specimens, the types, both with fruit, 1 evidently jointed, the other questionably so, both with terminal portions deciduous.

E. australis: 1 specimen, the type, jointed and deciduous. (See *plate 1*.)

E. brevifolia: 5 specimens, 4 with fruit, 3 evidently jointed, 1 uncertain, the 4 deciduous.

E. campanulata: 1 specimen, the type, in flower only.

E. triflora: 20 specimens, 16 in fruit, all unjointed and wholly persistent, also in all of the next seven forms.

E. affinis: 2 specimens, type and co-type, both in fruit.

E. (*Hartman 700*): 1 specimen, in fruit.

E. arizonica: 7 specimens, 5 in fruit, including the type and a co-type.

E. tridentata: 3 specimens, all *Palmer 306* (type and co-types).

E. cinerascens: 6 specimens, 3 in fruit.

E. aliena: 1 specimen, the type.

E. grisea: 2 specimens, *Leiberg 5576* and *Barber 57*.

E. canescens: 2 specimens, *Brewer 2064*, *Heller 7159*, both unjointed, but Heller's plant with a few of the style tips broken off.

This ends the record as to the "unjointed and persistent" character of the style in the material before me, and it may easily be seen that there is but little in the way to permit an arrangement of the named forms into two groups, which, for present convenience, may be called the *Ciliatae* and *Triflorae* respectively.

Color oj the petals.—Now let us give attention to this phase of the subject, first reviewing what literature leads us to expect. After the Latin description of *G. ciliatum*, Pursh (**1**) says: "flowers resembling those of No. 6." No. 6 is *G. rivale*, and of that he says "flowers yellowish-purple." According to various subsequent authors the "flowers" or "petals" are: "white," Nuttall (**2**); "yellowish-white, tinged with purple, persistent," Torrey(**4**); "purplish," Gray (**5**), Brewer and Watson (**8**); "richer purple than common," Cooper (**6**); "grandes, blanche veinees de pourpre," Provancher (**7**). Of these I especially note with pleasure the statements of Torrey and Provancher; but let me also call attention to the works of more recent authors, where we will find the color recorded as "light purple," Britton (**10**), Rydberg (**14**); "pale purple," Piper (**13**); "purplish," Robinson and Fernald (**15**), Coulter and Nelson (**16**).

Greene (**12**), however, says of his *E. campanulata*, "petals crimson tinted; of *E. dissecta*, "petals yellow," and of *E. flavula*, "calyx-segments purple-veined like the petals and yellowish," but of the remainder of his species the question of the color of the corolla is left for one to guess at or find out as best one may.

As stated in the introduction to the paper, the petals in the northern Utah plants collected by me were *pale yellow*, more or less margined and veined with *dull reddish*, a combination that I failed to interpret as "purplish." This coloration being well preserved in my specimens, I have used the same as the basis for comparison in making the tabulations, from which the following records are drawn:

Beginning with *E. ciliata*, 64 specimens are found with corollas that may be judged as to color. Of these, 6 may be called yellow with conspicuous red-purple apices, another 8 yellow with pronounced red (hardly purple) markings, and 50 must be put down as pale yellow with more or less reddish margining and veining of the petals. Those of *E. campanulata*, as described by Greene, are conspicuously "crimson-tinted," which agrees with what I have called "red-purple" above. Two of the 3 specimens of var. *ornata* have pronounced apical and marginal red-purple, as also 1 out of 6 specimens of *E. dissecta*, which may be passed upon. As to the other 5 specimens of *E. dissecta* and those of *brevifolia*, *australis*, and *flavula*, worthy of mention, the petals are simply pale yellow, as in most of the *ciliata* material at hand.

Of the 17 specimens of *E. triflora* with flowers present, 9 show prominent markings with red or red-purple, 4 are apparently almost unmarked pale yellow, and in 4 the petals are so withered and discolored as to discount any conclusion in their case. Of 6 flowering specimens of *E. cinerascens*, 3 may well be called "yellowish-purple," while in the other 3 the slight red pigment present might easily be neglected. Without making detail records as to the rest of the *Triflorae*, since so few specimens are at hand, I may simply say that in all specimens of *E. affinis*, *arizonica*, (*Hartman 700*), *grisea* and *aliena*, in which the color of the corolla may be judged, it is the same pale yellow with more or less inconspicuous reddening of the veins. The specimens of *E. canescens* and *E. tridentata* give us no certain information as to the corolla coloration; but I fully expect that it will prove to be the same with them as with the last four.

Key to the described forms.—One of the first things attempted upon getting access to the description of Greene's segregates, was to make a key for use in determining specimens, especially my own; but the result was so unsatisfactory that the attempt was soon abandoned. With the specimens before me, however, and tabulations made, the following key was constructed, items from Greene's descriptions being used as freely as possible.

1. Style hooked, bent, or articulated, the terminal portion often deciduous: leaflets commonly cleft, with narrow divisions (*Ciliatae*) 2
Style neither hooked, bent, nor articulated, usually wholly persistent; leaflets mostly toothed to lobed, hardly cleft (*Triflorae*) 6

2. Basal leaves long and loosely clustered; leaflets mostly 20 mm. or more in length 3
Basal leaves short and densely clustered; leaflets mostly 15 mm. or less in length 5

3. Calyx bractlets cleft into narrow divisions *E. ciliata ornata*
Calyx bractlets entire, rarely toothed 4

4. Leaflets well separated, rarely touching *E. dissecta*
Leaflets more crowded, more or less overlapping *E. ciliata*, *E. flavula*, *E. australis*

5. Bractlets shorter than the calyx lobes; petals conspicuously red-purple tipped *E. campanulata*
Bractlets more conspicuous; petals mostly yellow *E. brevifolia*

6. Basal leaves long and loosely arranged; leaflets mostly over 20 mm. long 7
Basal leaves short and condensed; leaflets mostly under 15 mm. long 11

7. Leaflets not deeply lobed; petals often red-purple tipped or margined 8
Leaflets rather deeply lobed; petals yellow with little or no red 9

8. Leaflets broadly cuneate, the lateral lobes toothed and more spreading *E. triflora*
Leaflets evidently narrow, the lateral lobes simple and nearly parallel *E. affinis*

9. Leaflets sparsely appressed pilose, not prominently ciliate-cuspidate 10
Leaflets noticeably villous-pilose, minutely glandular dotted, the teeth prominently ciliate-cuspidate *E. tridentata*

10. Calyx bractlets, calyx lobes and petals nearly equal in length (*Hartman 700*)
Calyx bractlets surpassing the nearly equal petals and calyx lobes *E. arizonica*

11. Leaflets broadly cuneate, lobed, the lobes toothed 12
Leaflets more narrowly cuneate, toothed but not lobed 13

12. Leaflets with lobes and teeth very broad; densely soft villous-canescent; plumes about 30 mm. long *E. canescens*

Leaflets with lobes and teeth normal, appressed villous; plumes about 50 mm. long *E. cinerascens*

13. Foliage hoary, villous-tomentose; calyx lobes long-acuminate, surpassed by the linear bractlets *E. grisea*

Foliage pilose-ciliate; calyx lobes ovate-lanceolate, not surpassed by the bractlets. *E. aliena*

The key is, of course, but tentative, and intended especially for the use of field workers in the various localities where the little known forms occur. The illustrations, will, of course, be used in interpreting the key, average leaflets (from near the middle of the leaves) of most of the forms being represented. The expression "ciliate-cuspidate," used above, may be taken to mean a terminal tuft of fine hairs very much simulating a cusp.

Additional observations.—Leiberg 2555 (Oregon) and *Kronkhite 38* (Oregon), are mentioned by Greene (**12**) as perhaps referable to *E. canescens*. Their pubescence surely suggests that of *E. canescens*, as does also that of *Kennedy 1630* (Nevada) and of *Kellogg and Harford 209* (California); but all four have the cleft leaflets of *ciliata* proper, and three (Kennedy's plant being in flower only) have also the *ciliata* style.

The 39 fruiting specimens of *E. ciliata* that may safely be designated as jointed are from: California 1; Washington 4; Oregon 6; Idaho 6; Utah 1 (my own *1670*); Montana 4; Yellowstone Park 2; Wyoming 6; and Colorado 9. The other 6 specimens in fruit are: *Shear 4422* Beaver canyon, Idaho; *Mearns 2907* Yellowstone, and *Rydberg and Bessey 4414* Bridger mountains, Montana, which have the style evidently unjointed, but the terminal non-accrescent portion deciduous. *Griffiths and Hunter 80* Camas Prairie, Oregon, *E. W. Sheuber* Sunset, —? and *Rydberg 660* Custer, South Dakota, are evidently unjointed and persistent. *Rydberg 660*, however, should perhaps have been better classified as a transition form, and placed with the following.

As to *E. triflora*, the 16 fruiting specimens came from the following states: Illinois 5; Wisconsin 2; Minnesota 3; Iowa 2; South Dakota 3; and a specimen collected by Havard from the "Upper Missouri." The leaf characters of this Havard specimen, however, would warrant placing it with *E. affinis*. Strange that with so much material, none is at hand from east of Illinois. Newfoundland and Labrador specimens ought to be worthy of special study.

The sheet of *McCalla 2073* in the Cornell Herbarium includes two quite different things, the one on the left being a true co-type of *E. affinis*, the other a fair example of *E. ciliata*. Persons having specimens of this collection should note carefully the figures in *plate 3*. Also, collectors who may visit Banff, Alberta, may find field observations there to be especially interesting.

The specimen of *Hartman 700* from Chihuahua, Mexico, seems to represent the Mexican form of *E. triflora*, but it will probably prove to be indistinguishable from *E. arizonica*. It bears the same relation to *E. arizonica* that *E. aliena* does to *E. grisea* (see key). *Barber 57* from Williams, Arizona, is evidently *E. grisea*, tho apparently not determined by Dr. Greene.

Final discussion.—Dr. Greene, under *E. ciliata* (**12** 177) says: "Nothing is more easy than to distinguish these plants as a group, from the eastern *E. triflora*. To this I can readily agree, tho perhaps with a trifle less emphasis. To me this distinction can readily be extended to include all of the named forms, giving us the groups *Ciliatae* and *Triflorae*, as designated above. Now if these groups are indeed capable of separation on these or other characters, what about the long-accepted merging of the two original species of Pursh? And again, if these two groups, or species, or what one may choose to call them, be really separable on the characters presented in this paper, what about the continued inclusion of the *Ciliatae* in the genus *Sieversia* of Willdenow, or in the section *Sieversia* under *Geum*, as accepted by Gray? Surely a readjustment, or recharacterization of something should be done.

As claimed by Greene, these plants seem to be representative of a generic type sufficiently distinct from both typical *Geum* and *Sieversia*, and his genus *Erythrocoma* must therefore be accepted, if such a view is to be acknowledged. *Erythrocoma*, however, must be, in part at least, recharacterized, and careful analysis of the matter meets with important difficulties.

To quote further from Greene (**12** 174), in *Sieversia* the "mature styles are long, filiform, plumose to the very apex." And again (**12** 175), referring to "the type that has been called *Geum triflorum* and *Sieversia triflora*," "the accrescent and plumose character of the styles it has in common with *Sieversia*." Now the fact is that the style is accrescent *only* to the *elbow*, *hook*, or *articulation* (or where such would be if present), and only the accrescent part is *red* and *plumose*, the non-accrescent terminal portion being practically *glabrous* and light brown, *persistent* or *deciduous*. Only when the terminal portion is gone from the style, can that organ be said to be "plumose throughout." But such a statement must indeed be seriously questioned as having taxonomic value here. Others of the characters of *Erythrocoma*, however, are the erectness of the petals and calyx lobes, color of calyx and corolla, and, I may add, flowers nodding in anthesis; but all these characters are common to *Geum rivale*, which really seems to be closer, to my mind, to *Erythrocoma* than does *Acomastylis*. It seems to me, therefore, that *Erythrocoma* must be given due place as a section of *Geum*, *sensu latu*, and distinct from *Sieversia;* or *G. rivale* must be made the type of another genus, co-ordinate with *Sieversia*, *Acomastylis*, *Erythrocoma*, etc., in which case the real status of *Caryophyllata* Tourn. must be investigated.

Conclusions.—While certain questions that have arisen during this study must be left for further investigation, I feel that I am justified in coming to the following rather definite conclusions. *Geum ciliatum* Pursh, and *G. triflorum* Pursh, are worthy of recognition as separate species, neither name being synonymous with the other. Probably these two species are the only forms worthy of specific standing, the other named forms being better considered as varieties of one or the other. *Ornata*, *dissecta*, *campanulata*, and perhaps *brevifolia*, seem to be recognizable varieties of *E. ciliata*. I have failed to find characters sufficiently strong to really separate *flavula* and *australis* from the variations existing in the aggregate which I, as well as Dr. Greene (**12** 177), "fail to resolve into its specific elements by any certain characters."

Affinis, *tridentata*, *arizonica*, *cinerascens*, *grisea* and *canescens* I am prone to think may prove to be worthy local varieties of *E. triflora*, but *aliena* is, as I see it, too close to *grisea* to warrant recognition. Such variation exists in the relative lengths of the petals, calyx lobes, and calyx bractlets (even in different plants of the same collection), that I feel that very little dependence can be placed upon these in taxonomic questions.

Cornell University, Ithaca, N. Y.

PLATE I

STYLE VARIATIONS

Unjointed

Figure 1. *E. canescens.* *Brewer 2064* (type), Ebbett's pass, California.

Figure 2. *E. triflora.* *Umbach*, 1897, West Chicago, Illinois.

Hooked

Figure 3. *E. australis.* *Baker 214* (type), Cimarron, Colorado.

Figure 4. *E. ciliata.* *Smith 1670*, Cache Junction, Utah.

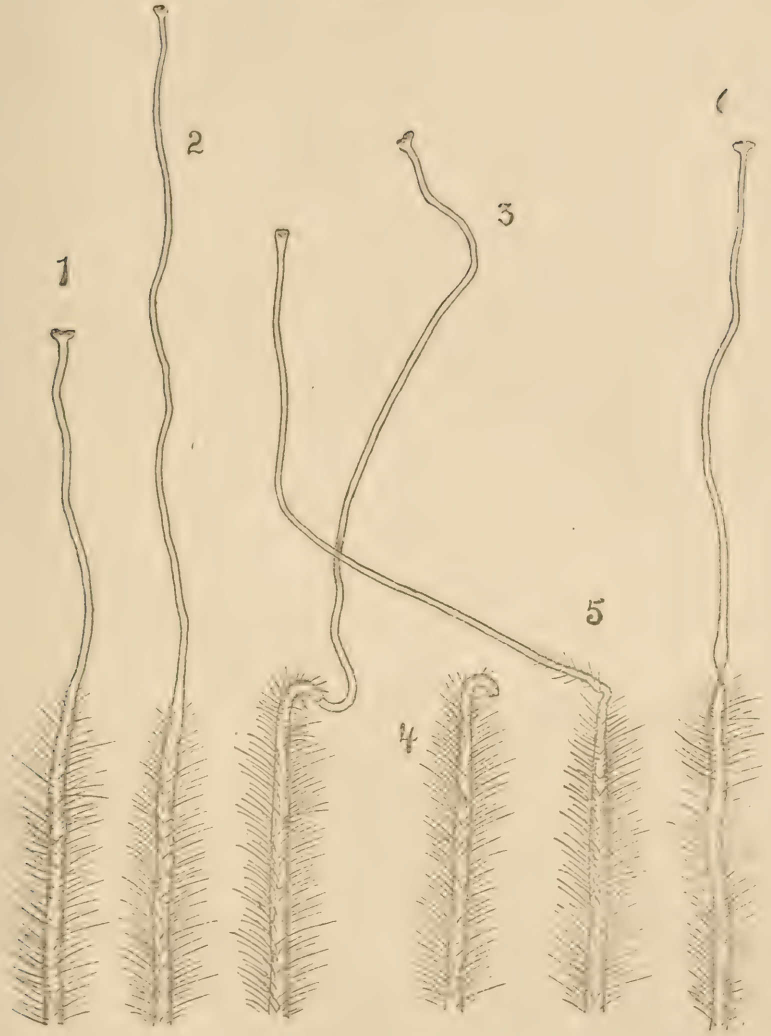
Elbowed

Figure 5. *E. ciliata.* *Smith 1670*, Cache Junction, Utah.

Articulated

Figure 6. *E. flavula.* *Nelson 829* (type), Union pass, Wyoming.

Plate 1



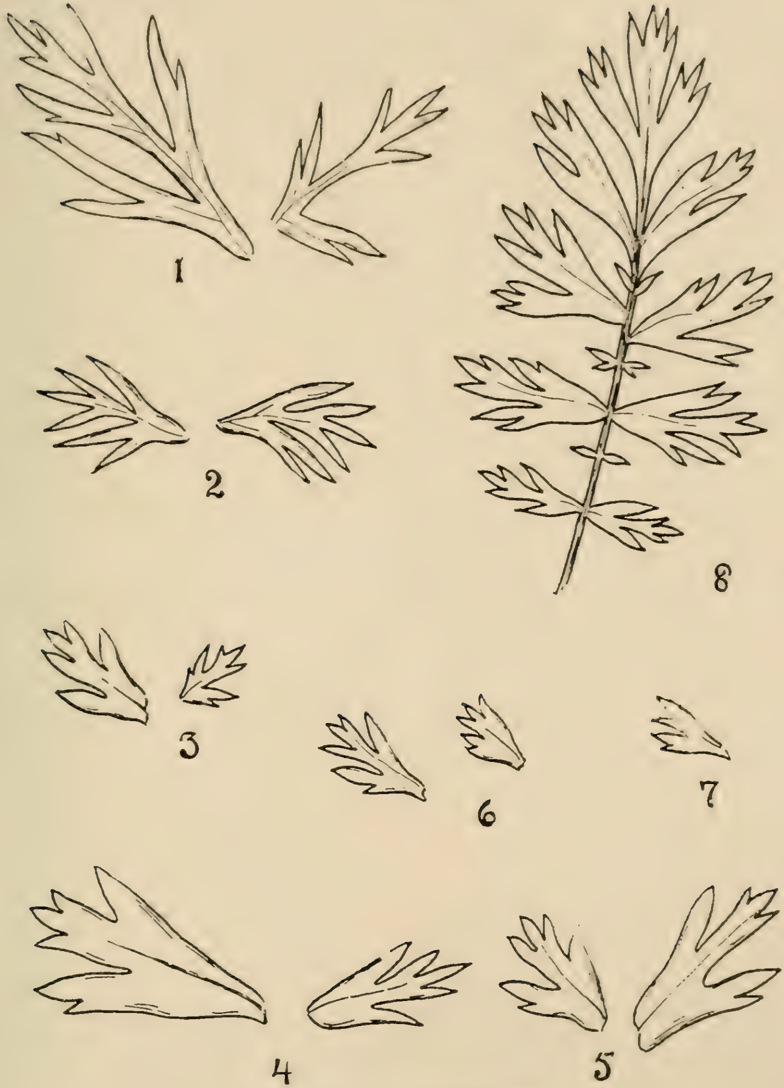
SMITH, on Erythrocoma

PLATE 2

CILIATAE

Figure 1. *E. ciliata.* *Piper 1532*, Pullman, Washington.
Figure 2. *E. ciliata.* *Cusick 2179*, Oregon.
Figure 3. *E. ciliata.* *Stevenson 104*, La Barge, Wyoming.
Figure 4. *E. ciliata?* *Griffiths and Hunter 80*, Camas Prairie, Oregon.
Figure 5. *E. australis.* *Baker 214* (type), Cimarron, Colorado.
Figure 6. *E. campanulata.* *Elmer 2529* (type), Olympic mountains, Washington.
Figure 7. *E. dissecta.* *Tweedy 223*, Cripple Creek, Colorado.
Figure 8. *E. dissecta.* *Baker, Earle and Tracy 372* (as in the Cornell Herbarium), Chicken creek, West Platte mountains, Colorado.

Plate 2



SMITH, on Erythrocoma

PLATE 3

TRIFLORAE

Figure 1. *E. triflora.* *Umbach*, 1897, West Chicago, Illinois.

Figure 2. *E. affinis.* *McCalla 2073* (type), Banff, Alberta.

Figure 2a. *E. ciliata.* *McCalla 2073 pars* (as in Cornell Herbarium).

Figure 3. *E. affinis?* *Havard*, "Upper Missouri."

Figure 4. *E.* ———. *Hartman 700*, Chihuahua, Mexico.

Figure 5. *E. arizonica.* *MacDougal 65* (type), Mormon lake, Arizona.

Figure 6. *E. tridentata.* *Palmer 506* (type), White mountains, Arizona.

Figure 7. *E. cinerascens.* *Forwood 106* (types), Fort Meade, South Dakota.

(b) Sheet *317360*, U. S. National Herbarium.

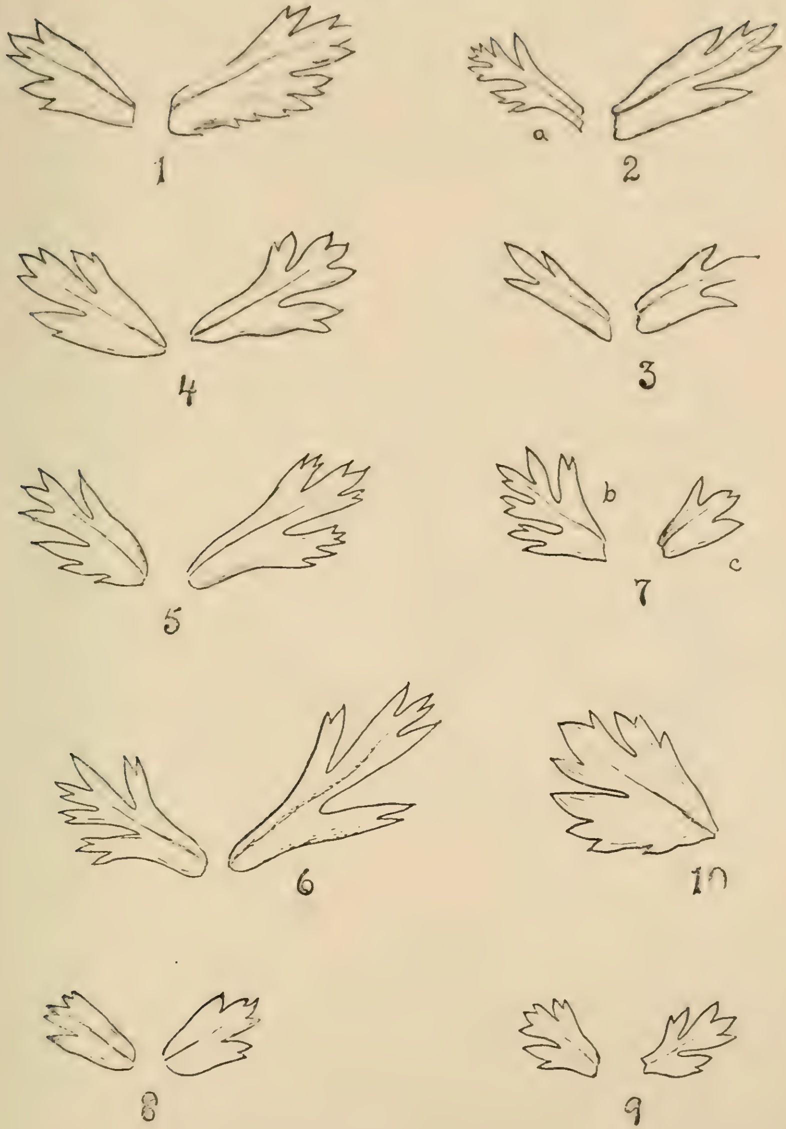
(c) Sheet *317373*, U. S. National Herbarium.

Pigure 8. *E. aliena.* *Townsend and Barber 15* (type), Sierra Madres, Chihuahua, Mexico.

Figure 9. *E. grisea.* *Leiberg 5578* (type), San Francisco Peaks, Arizona.

Figure 10. *E. canescens.* *Heller 7159*, Donner Pass, California.

Plate 3



SMITH, on Erythrocoma

ALPINE PLANTS—VI.

By P. Beveridge Kennedy

Alpine Monkey Flower, Mimulus implexus Greene

Several years ago a lady friend botanist when referring to the genus Mimulus, used the expression, "Oh, my beautiful Mimuli!" So when the writer came across the gorgeous golden mass produced by the plant which we use in our illustration and recognized it as a Mimulus, he realized very keenly the feeling that caused the above sentiment.

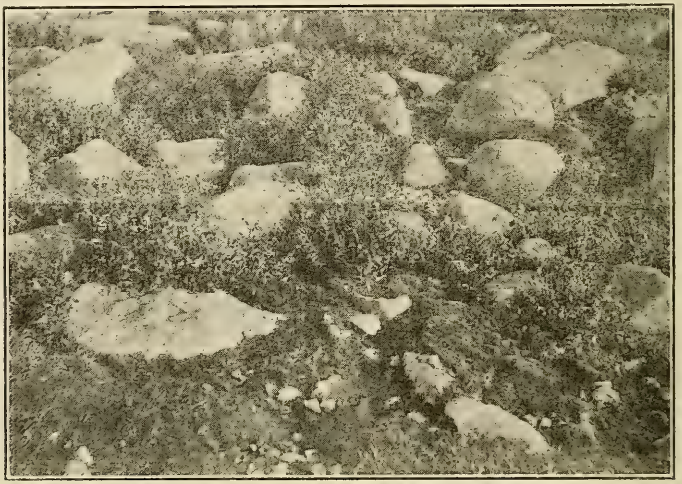


Figure 1. *Mimulus implexus* Greene

The plants appear on a moraine of wet rocks over which a turbulent cold mountain stream had recently subsided. At first glance but little else could be seen besides the masses of large yellow flowers. On collecting the plants, one finds numerous fine fibrous roots and fleshy light brown rootstocks matted between the rocks, preventing the scanty soil from being washed away. From these, slender stems obout a span high arise. They are naked at base, but with several pairs of leaves above. The lowest ones are lanceolate-ovate, with an attenuated broad petiole. The upper ones, from which the flowers first make their appearance, are broadly ovate and strictly sessile. All are more or less irregularly toothed and 3-nerved. From the broad ovate pair three flowering stems about 4 cm. long are produced, the two lateral ones ending in a solitary flower with naked pedicels, while the central stem continues on and sends off two more solitary flowers in like manner. The corolla is 25 mm. long, strongly bilabiate, with a densely bearded and purple dotted throat. The calyx is 10 mm. long, purple dotted, 5-toothed, four of equal length, and one extending 3 mm. beyond the others.

This plant was first described by Greene in Bull. Cal. Acad. **1**: 110. 1885, as *M. Tilingi* Regel. Ten years later, in Journal of Botany **33**: 8, he announces that Regel's plant is a member of the *Langsdorffii* group, and gave the name *M. implexus* to this plant. A year later he discovered that his *implexus* included two distinct species, and in Erythea **4**: 2, described *M. corallinus*. We found this latter species in our *implexus* cover, *Heller 7004*, collected July 23, 1903, three miles above Truckee, Nevada county, California. The character of the rootstocks of this species, well shown on the above mentioned specimen, are extremely interesting and characteristic.

Greene also calls attention to the character of the leaves of *M. implexus*, which he describes as "exceedingly thin membranaceous," and explains that this character belongs to *M. corallinus* and not to *implexus*.

Specimens were collected at the time the photograph was taken, and it is from these we get our notes. They are from Mt. Rose, Washoe county, Nevada, elevation 9650 feet August 17, 1905, *Kennedy 1190*. Heller also collected it in a more reduced form at the same place in September, 1909, no. *9969*. Another sheet placed here is from the East Humboldt or Ruby mountains, Elko county, August 11, 1908, elevation 10100 feet, *Heller 9386*.

This species may be looked for in herbaria in that great aggregate of forms and perhaps species under the guise of *M. Langsdorffii*. So far as we know, it is not in cultivation, but it would be difficult to find a plant more acceptable to lovers of alpines.

NEW COMBINATIONS—VII.

By A. A. Heller

Alsinopsis arctica (Stev.)
Arenaria arctica Stev. in DC. Prodr. **1:** 404. 1824.

Alsinopsis californica (Gray)
Arenaria brevifolia var. (?) *californica* Gray, Proc. Cal. Acad **3:** 101. 1864.
Arenaria californica Brewer, in Bolander, Cat. 6. 1870.

Alsinopsis Douglasii (Fenzl)
Arenaria Douglasii Fenzl; T. & G. Fl. N. A. **1:** 674. 1840.

Anisolotus grandiflorus (Benth.)
Hosackia grandiflora Benth. Trans. Linn. Soc. **17:** 366. 1836.
Lotus grandiflorus Greene, Pittonia **2:** 145. 1890.

Anisolotus rigidus (Benth.)
Hosackia rigida Benth. Pl. Hartw. 305. 1849.
Lotus rigidus Greene, Pittonia **2:** 142. 1890.

Anisolotus strigosus (Nutt.)
Hosackia strigosa Nutt.; T. & G. Fl. N. A. **1:** 326. 1838.
Lotus strigosus Greene, Pittonia **2:** 141. 1890.

Miltitzia glandulifera (Torr.)
Emmenanthe glandulifera Torr. in Wats. Bot. King Rep. 157. 1871.

THE FLORA OF THE RUBY MOUNTAINS—IV

By A. A. Heller

Apparently only one of the canyons of the South Fork has received a name—Rattlesnake canyon, the southernmost one. On August 11th we started up what may be called the middle canyon, the way leading for several miles along a stream coming from the adjoining canyon on the north, then changing to a broad, low ridge, which was crossed at about 7000 feet, when we entered the proper canyon. Here, a short distance above the stream, on the sage brush covered slope, but in fairly moist soil, one of the first plants noticed was an unknown Apocynum. It was compared with material in the great eastern herbaria last summer, and nothing like it was seen.

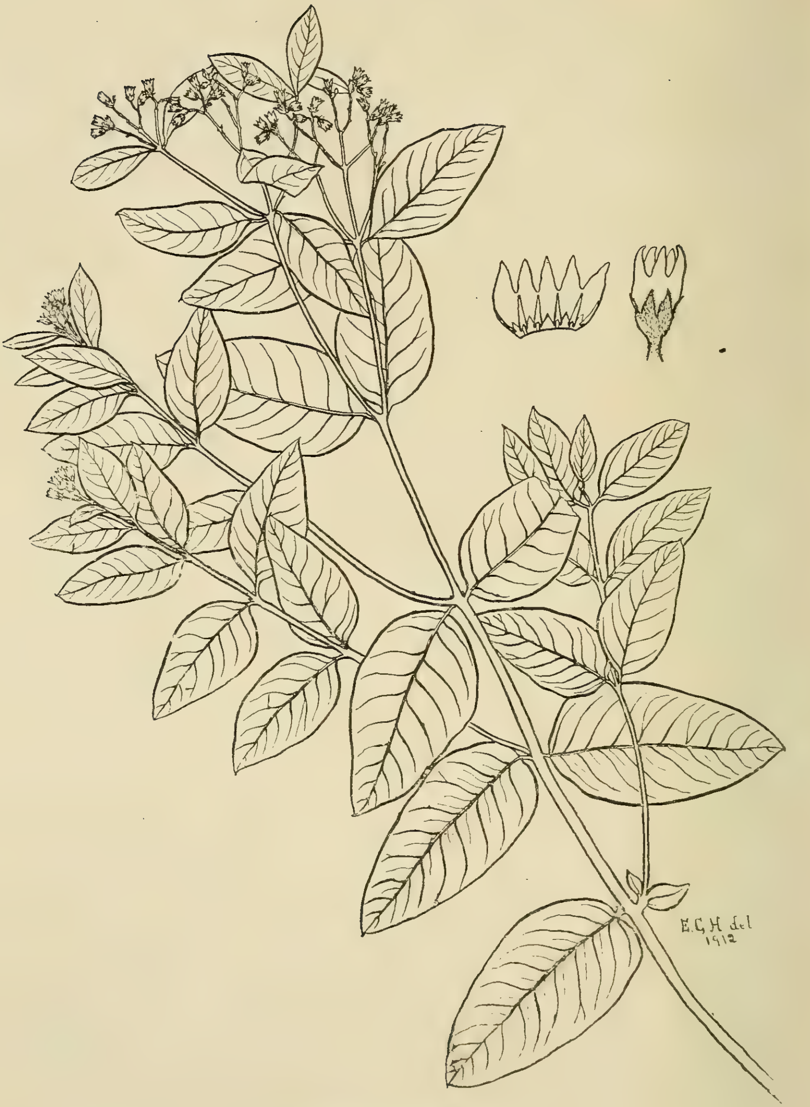
Apocynum cinereum n. sp.

Stems several from a thick woody rootstock, 6 dm. high, purplish, finely cinereous, as are also the other parts of the plant, simple below, branched from a little below the middle, the branches somewhat cymose but not symmetrical: leaves ovate-lanceolate, apiculate, the larger ones 6 cm. long, 3.5 cm. wide, dull green above, pale beneath, midvein yellowish, prominent; petioles short, about 3 mm.: cymes short, 3 to 4 cm. long and about as broad: pedicels 2 mm. long, the lanceolate, scarious bractlets at their base about half as long: calyx 2 to 2.5 mm. long, the lobes oblong-lanceolate, acute, 1.5 to 2 mm. long, barely 1 mm. wide at base: corolla pinkish, 5 mm. long, the erect lobes lanceolate, 2 mm. long, 1.5 mm. wide at base: stamens 3 mm. long, the yellow lanceolate-acuminate anthers fully 2 mm. long, the saggitate-acute basal lobes extending .5 mm on either side of the stout, .5 mm. wide filament: fruit not seen.

The type, in the herbarium of the Nevada Agricultural Experiment Station, is *Heller 9383*, collected August 11, 1908, in the middle canyon of the South Fork of the Humboldt, above Lee post office, Elko county, Nevada, altitude 7200 feet.

This, in some respects peculiar species, is referable to the cannabinum group on account of its small and narrow flowers, but the leaves and comparatively small size of the plant, with

Plate 4



Apocynum cinereum Heller

spreading branches, would associate it with the androsaemifolium group. It is probably nearest related to the glabrous *A. oliganthum* Greene, of western Nevada, which has synonyms in *A. viarum* Heller, Muhlenbergia **2**: 110. 1906, and *A. bicolor* McGregor, Bull. Torr. Club **37**: 261. 1910, the latter from the type region of *A. oliganthum*.

Just below the Apocynum station, in low ground near the stream, in an aspen grove, *Calochortus nitidus* was plentiful. This is one of our handsomest species, the perianth segments white with a purple spot at the middle. They stand well apart from each other, and are peculiar in being very persistent. This species is not recorded by Watson.

For the greater part of the way the trail led along the stream, crossing and recrossing it, winding through aspen thickets and other undergrowth, much of it enlivened by clumps of brilliantly colored flowers.

At 8700 feet a halt in a meadow on the banks of the ice cold stream, yielded the type of *Carex fissuricola* Mackenzie, while near at hand were *Allium validum*, *Bistorta linearifolia* and *Parnassia intermedia*, all originally collected in this range. The latter is the *Parnassia fimbriata* of Watson.

At 9300 feet before climbing up a cross ridge, or rather a bench which stretches across the canyon, and through which the stream cuts at one side, an open place covered with coarse granite sand yielded *Spraguea nuda* and *Polygonum Austinae?* the former at least far removed from its hitherto known range in the Sierra Nevada.

Between 9550 and 9600 feet are found three small lakes, and about them a rich profusion of plants. Several of the most interesting are *Silene acaulis*, carpeting dripping rocks, and with it the diminutive *Salix saximontana; Pneumonanthe calycosa* on the raised wet borders of the lakes, in company with *Micranthes arguta* and *Caltha rotundifolia*. Here the latter was in fruit, while only a hundred feet higher in the open meadow along the stream were numerous plants with newly opened flowers.

A dry slope on the south side, above the meadow, produced several Erigerons, Senecios and Arnicas, growing among scattered pine trees at 9700 feet, while in a damp place, still on the slope at 9900 feet were found *Oreobroma pygmaea* and *Lithophragma bulbifera.* The latter is another of the few species common to both eastern and western Nevada, being abundant locally in the mountains west of Reno.

A surprise awaited me at 10100 feet at the head of the canyon, for here, among the stones in the shallow stream bed was *Mimulus implexus*, just as it occurs with us on Mt. Rose and at other places in the Sierra Nevada.

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A new edition of the Catalog of North American Plants is in preparation. Thus far 140 pages have been printed, and other parts will follow as fast as possible. In all there will be about 300 pages. Since a considerable time must elapse before the work can be completed, the 140 pages and other parts as soon as issued, will be sent to those who wish to have them in that form, for $1.25, payment to be sent with the order.

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Volume 8 Number 3

MUHLENBERGIA

MARCH, 1912

Editors: A. A. HELLER and P. BEVERIDGE KENNEDY

Elephantella attolens (Gray) Heller

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University of Nevada,
Reno, Nevada

Volume 8 March 30, 1912

MUHLENBERGIA

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NEW
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ALPINE PLANTS—VII.

By P. Beveridge Kennedy

Little Elephant's Head (*Elephantella attolens* (Gray) Heller

Gray first described this species in 1867 from plants collected in the swamps of the high Sierra Nevada mountains by Brewer, Torrey, Bolander, and Bridges, giving it the name *Pedicularis attolens.* Rydberg, in his Flora of Montana, recognized the striking difference in the appearance of the flowers of these plants when compared with the louseworts or true Pedicularis. He proposed the very appropriate name *Elephantella*, "in allusion to the form of the corolla, which strikingly resembles the head of an elephant, the produced beak of the galea forming the trunk, the lateral lobes of the lip the ears, and the stigma the

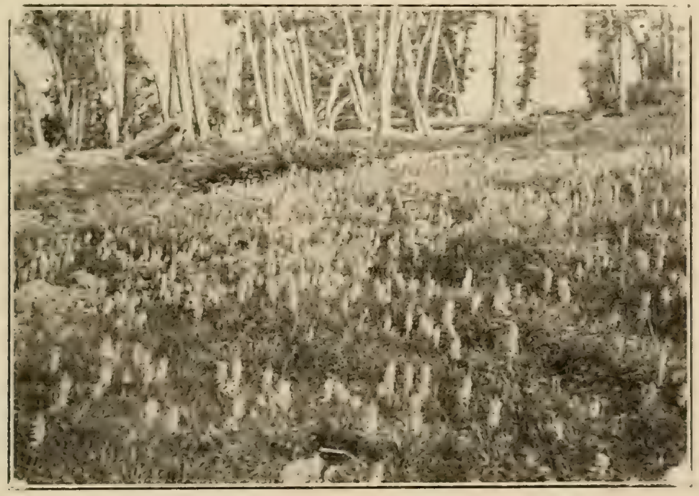

Figure 2. *Elephantella attolens* (Gray) Heller

finger-like appendage of the trunk." These characters are even more pronounced in the larger and more common relative, the large elephant's head, *Elephantella groenlandica*.

The photograph was taken on Mt. Rose, Washoe county, Nevada, at an elevation of about 10000 feet. The trees in the background are the alpine white pine, *Pinus albicaulis*.

THE MONARDELLAS OF SOUTHERN CALIFORNIA—I

BY L. R. ABRAMS

The genus *Monardella* is peculiar to western North America, ranging from eastern Washington southeastward through the Great Basin region to Colorado, and southward along the Pacific slope to Lower California and Cedros Island. It reaches its greatest development in the Transition and Upper Sonoran zones of central and southern California. There are probably thirty or more species, but the group is an extremely plastic one, which makes the definition of specific lines difficult.

Flowers in rather loose heads: calyx 12 to 28 mm. long: corolla tube well exserted, much longer than the corolla lobes: pollen sacs strongly divaricate, ovate-oblong: perennials. I. MACRANTHAE.

Flowers in dense heads: calyx 10 mm. or (usually 8 mm.) less in length: corolla tube scarcely exserted, but little longer than the corolla lobes: pollen sacs not strongly divaricate, short rounded-oblong: annuals or perennials. II. PYCNANTHAE.

I. MACRANTHAE

Corolla tube narrowly funnel form: calyx 3 to 4 mm. wide: filaments stoutish; anthers 1.25 mm. long

Anthers well exserted: corolla scarlet

Herbage sparsely pubescent or puberulent 1. M. macrantha

Herbage more or less densely villous 1a. M. macrantha Hallii

Anthers scarcely equaling, or the longer slightly exceeding the corolla lobes: corolla yellowish, the tube very slender funnelform 1b. M. macrantha longiloba

Corolla tube narrowly cylindrical, scarcely over 1 mm. wide or less: calyx 2 mm. wide: filaments decidedly filiform; anthers 0.7 mm. long.

Herbage sparsely villous or pubescent with spreading hairs: flowers yellowish, tinged with rose; corolla tube 1 mm. or slightly more in width.

Corolla tube about 15 mm. long, its lobes 6 to 7 mm. long: herbage pubescent 2. M. nana

Corolla tube about 20 mm. long, its lobes 7 to 10 mm. long: herbage villous 2a. M. nana leptosiphon

Herbage cinereous with a short appressed pubescence: flowers pale yellow or white; corolla tube less than 1 mm. wide.

Corolla tube about 20 mm. long, its lobes about 6 mm. 2b. M. nana tenuiflora

Corolla tube 15 to 18 mm. long, its lobes usually less than 5 mm. 2c. M. nana arida

II. Pycnanthae

Perennials

Leaves not undulate or crisped on the margin

Leaves similar on both surfaces

Herbage cinereous with short, dense, villous-like tomentum; leaves ovate-triangular, irregularly denticulate 3. M. cinerea

Herbage glaucous green, or silvery with a minute puberulence, not at all tomentose

Stems villous, with spreading multicellular hairs: leaves villous pubescent 4. M. australis

Stems short pubescent or puberulent, with recurved hairs

Leaves bright glaucous green: stems short pubescent, with slender 2-celled hairs

Bracts purple, broadly to narrowly ovate, acute: stamens glabrous to their bases, these and the corolla throat very sparsely villous: low tufted plants 5. M. epilobioides

Bracts lanceolate, herbaceous or nearly so: stamens villous below the middle: corolla throat copiously villous below the insertion of each stamen 5a. M, epilobioides erecta

Leaves canescent or silvery: stems puberulent with recurved subulate or triangular, 1-celled hairs

Upper surface of leaves with upwardly appressed or curved hairs

Herbage glaucous green with rather sparse, evident puberulence: oil ducts on lower surface of leaves crowded 6. M. viminea

Herbage silvery, clothed with dense very fine puberulence scarcely perceptible under a strong lens: oil ducts on under surface of leaves scattered 7. M. linoides

Upper surface of leaves with retrorsely appressed or curved hairs: herbage silvery canescent with very dense and evident puberulence 8. M. oblonga

Leaves densely hoary tomentose beneath, glabrous or villous above

Leaves ovate to ovate-oblong, glabrous and dark green above; lateral veins impressed on the upper surface. 9. M. hypoleuca

Leaves appearing linear from strongly revolute margins, villous above; lateral veins obscure with no impressions above 10. M. lanata

Leaves undulate on margin, somewhat succulent; stems woolly tomentose 11. M. crispa

Annuals

Leaves undulate on margin: bracts and calyx villous: stems pubescent 12. M. undulata

Leaves not undulate
 Bracts obtuse or acute
  Bracts 10 mm. or more in length: calyx 7 mm. long, teeth triangular-subulate, usually with bristle-like hairs at the sinuses 13. M. lanceolata
  Bracts 6 mm. or less in length: calyx 6 mm. long, teeth triangular, without bristle-like hairs 13a. M. lanceolata microcephala
 Bracts abruptly acuminate: calyx teeth triangular-subulate
  Bracts villous pubescent: calyx teeth villous pubescent, not hyaline tipped 14. M. Pringlei
  Bracts short pubescent or puberulent
   Calyx teeth short pubescent, not hyaline tipped, these and bracts tinged with rose 15. M. Elmeri
   Calyx teeth villous, their margins and tips hyaline, these and bracts with white or rarely rose tinged margins 16. M. exilis

1. MONARDELLA MACRANTHA A. Gray, Proc. Am. Acad. **11:** 100. 1876.

Madronella macrantha Greene, Leaflets **1:** 169. 1906.

Stems slender, lignescent at base, branching from a slender creeping rootstock, 2 to 5 dm. high, pubescent or puberulent with more or less recurved hairs; internodes 2 to 5 cm. long: leaves ovate to elliptical, 1 to 2 cm. long, on petioles about half their length, entire or rarely faintly serrate, nearly or quite glabrous: bracts equaling or shorter than calyx, thin, more or less membranaceous and colored, ciliate on margins with long villous hairs: flowers 10 to 20 in head: calyx usually over 2 cm. long, villous at base, glandular pubescent throughout, teeth 4 mm. long, subulate: corolla 3 to 4 cm. long, slender funnelform, scarlet or tinged with yellow, minutely and sparsely pubescent without: stamens exserted beyond corolla lobes; anthers on rather stout filaments 1.25 mm. long between tips of diverging pollen-sacs.

Thirty-one herbarium sheets of this species are before me, and throughout all of them, except those referred to the variety *longiloba*, the funnelform corolla tube and exserted stamens hold well as characters. The size of the anther is also a well marked distinguishing feature between this and the *nana* group. In pubescence there seems to be a complete gradation from merely puberulent stem and glabrous leaves to the densely villous pubescent variety.

Type locality: "Southern part of California, on the Cuiamaca Mountains, and near Julian City, D. Cleveland, E. Palmer." Palmer's specimens, according to his field notes, were collected "among pines" on the Cuiamaca mountains.

Distribution: San Pedro Martir mountain, Lower California, Cuiamaca, Palomar and San Bernardino mountains of southern California, and reappearing again in the Santa Lucia mountains of Monterey county. Coniferous forests and upper altitudes of the chaparral belt of the coastal slope.

Specimens examined: Monterey county: Santa Lucia mountains, *Vasey 487*, Tassajara Hot Springs, *Elmer 3228*, Big Sur, *Davy 7436;* Palomar (Smith) mountain, *Orcutt 433*, *Brandegee*, August 1, 1898, *Susan G. Stokes*, July 5, 1896, *Chandler 5370:* Julian, *Dunn*, June 5, 1875; between Julian and Cuiamaca, *Abrams 3812;* Cuiamaca mountains, *Palmer 295*, *Brandegee*, July 6, 1894, *Susan G. Stokes*, July, 1895; Laguna mountains, *Orcutt*, July, 1899; San Pedro Martir mountains, *Brandegee*, May 16, 1893.

1a. MONARDELLA MACRANTHA **Hallii** var. nov.

Herbage densely villous pubescent throughout: calyx long villous and glandular pubescent throughout, otherwise like typical *macrantha*.

Type: Polomar mountain, *Hall 1936*, May, 1901.

Distribution: Palomar and San Bernardino mountains in coniferous forests and chaparral.

Specimens examined: Mill Creek canyon, San Bernardino mountains, *Parish*, May, 1898, and *4578*; Palomar mountain, *Brandegee*, August 1, 1898; *Hall 1936; Chandler 5370; McClatchie*, July 5, 1896; *Susan G. Stokes*, July 5, 1896.

1b. MONARDELLA MACRANTHA **longiloba** var. nov.

Monardella macrantha tenuiflora Hall, Univ. Cal. Pub. Bot. **1:** 110. *pl. 11.* 1902. Not *M. tenuiflora* S. Wats.

Stems villous pubescent, internodes 3 to 5 cm. long: leaves ovate, 15 to 25 mm. long, on petioles of about equal length, pubescent on both surfaces, lateral veins evident: calyx 20 mm. long, villous throughout and glandular pubescent, lobes subulate, 4 mm. long: corolla yellowish, tube 25 mm. long, very slender funnelform, 3 to 3.5 mm. broad at summit, short villous pubescent throughout, lobes 10 mm. long, equaling or slightly exceeding the stamens: filaments pubescent; anthers 1.25 mm. long.

These plants were referred by Hall to *tenuiflora*, but true *tenuiflora* is the montane form of *nana*, which Hall described as variety *pinetorum*.

Type: Chaparral belt of south side, canyon of San Jacinto river, at 4300 feet altitude, San Jacinto mountains, *Hall 976*, July 4, 1898. This specimen is the one figured by Hall, and is sheet *25485* in the University of California herbarium.

Distribution: Coastal slopes of the San Jacinto mountains, in the chaparral belt.

Specimens examined: Chaparral belt, San Jacinto river, San Jacinto mountains, altitude 4000 to 4400 feet, *Hall 669*, *687*, *976*.

2. MONARDELLA NANA A. Gray, Proc. Am. Acad. **11**: 101. 1876.

Monardella macrantha nana Gray, Syn. Fl. ed. 2, **2**: part 1, 459. 1886.

Madronella nana Greene, Leaflets **1**: 169. 1906.

Stems branching from a slender lignescent rootstock, 15 to 30 cm. long, internodes 15 to 30 mm. long, retrorsely pubescent: leaves ovate, 15 to 20 mm. long, green and very sparingly pubescent above, lateral veins evident on the lower surface: bracts narrowly ovate, 15 to 20 mm. long, membranaceous, pale, tinged with purple: calyx 12 to 15 mm. long, 2 mm. broad, villous and glandular pubescent, teeth subulate, 3 mm. long: corolla rose color or yellowish, tube cylindrical, 1.5 mm. broad, 15 to 18 mm. long, conspicuously pubescent without, lobes 5 to 6 mm. long, equaled by the longer pair of stamens: filaments very slender; anthers 0.7 mm. long.

In its typical form, this species has shorter and stouter corolla tubes than the extreme varieties, but the intergradation in pubescence and flowers seems complete.

Type locality: "S. California, in the Mountains behind San Diego, D. Cleveland." Collected near Talley's, according to specimens in the Brandegee herbarium.

Distribution: Typical *nana* seems restricted to the Cuiamaca mountains in the coniferous forest and upper chaparral belt.

Specimens examined: Julian valley, 1880 *Brandegee*, June 13, 1894 (approaching the variety *leptosiphon*); Cuiamaca mountains, *Hall 1202;* "San Felipe," *Parry;* Laguna mountains, *Orcutt*, July, 1889 (approaching variety *arida*); between Oriflamme canyon and Cuiamaca, *Abrams 3941;* Campbell's ranch, Laguna mountains, *Mearns 3642*.

2a. MONARDELLA NANA **leptosiphon** (Torr.) comb. nov.

Monardella villosa leptosiphon Torr. Bot. Mex. Bound. 129. 1859.

Closely resembling typical *nana* in habit, foliage and pubescence: calyx villous throughout: corolla tube sparsely pubescent, 20 to 25 mm. long, 1 mm. wide: corolla lobes 1 cm. long, exceeding the stamens: filaments very slender; anthers 0.7 mm. long.

Considered by Hall as intermediate between his variety *pinetorum* and the plant he figured as variety *tenuiflora* (*macrantha longiloba* of this paper). In general aspect this is true, but the slender cylindrical corolla tube, the filiform filaments and small anthers, clearly assign this to the *nana* group. The variety *longiloba*, on the other hand, retains the funnelform corolla tube, although narrower than that of true *macrantha*, and the stouter filaments and large anthers, characters that amply justify maintaining *macrantha* and *nana* as different specific groups.

The plants from "the central part of the State" referred to this variety by A. Gray (Syn. Fl. **2**: part 1, 357) are totally different, and belong to the villosa group.

Type locality: "San Felipe," probably in the mountains west of San Felipe canyon along the old San Diego-Fort Yuma road.

Distribution: Palomar mountain in chaparral and open forests.

Specimens examined: Palomar (Smith) mountain, *Orcutt 2110*, *Susan G. Stokes*, July, 1895, *McClatchie*, July 3, 1896, *Brandegee*, August 1, 1898; "San Felipe," *Parry*.

2b. MONARDELLA NANA **tenuiflora** (S. Wats.) comb. nov.

Monardella tenuiflora S. Wats.; A. Gray, Proc. Am. Acad. **17**: 230. 1882.

Monardella macrantha tenuiflora A. Gray, Syn. Fl. ed. 2, **2**: part 1, 459. 1886.

Monardella macrantha pinetorum Hall, Univ. Cal. Pub. Bot. **1**: 110. *pl. 12.* 1902.

Stems 1 dm. long or less, cinereous with close recurved pubescence: leaves ovate to elliptic, 15 mm. or less in length, finely pubescent above, lateral veins very obscure on lower surface: calyx villous throughout: corolla pale yellow, tube less than 1 mm. long: stamens included, or longer pair sometimes exserted.

This variety was well defined and figured by Hall as his variety *pinetorum*, but unfortunately he applied Watson's *tenuiflora* to a plant quite distinct from the original. Watson's species was based upon S. B. and W. F. Parish's *327*, which is cited by Hall under his variety *pinetorum*. Three sheets of this number and fragments of the type, kindly sent by Dr. Fernald from the Gray Herbarium, are before me, as well as several collections of Hall's, including duplicates (no. *2127*) of his type, and there can be no question that these specimens are all one and the same thing.

Type locality: "S. California, at San Jacinto, in San Diego, July, 1880, S. B. & W. F. Parish." The type is *S. B. & W. F. Parish 327*, which, according to the printed labels, was collected on San Jacinto mountain, and not "at San Jacinto."

Distribution: Apparently confined to San Jacinto mountains, where, according to Hall, it occurs in the yellow pine belt at 6000 to 8000 feet altitude.

Specimens examined: San Jacinto mountains, *S. B & W. F. Parish 327* (type); *Anthony*, July 2. 1895; *Hall 691, 2258, 2559; Reed 2491.*

2c. MONARDELLA NANA **arida** (Hall) comb. nov.

Monardella macrantha arida Hall, Univ. Cal. Pub. Bot. **1**: 111. *pl. 10.* 1902.

Herbage cinereous throughout with short close pubescence, stems short, usually less than 1 dm. long: leaves crowded, usually less than 1 cm. long, rather thick, lateral veins not evident: bracts white, tinged with rose, equaling or exceeding the calyx: calyx villous throughout: corolla white or cream yellow, tube scarcely over 0.5 mm. wide, 15 to 20 mm. long, lobes mostly less than 5 mm. long.

Type locality: "In the desert region to the southeast of San Jacinto Mt., along Coyote Creek, at 5000 ft. alt."

Distribution: Desert slopes of the San Jacinto and Santa Rosa mountains.

Specimens examined: Eastern base of San Jacinto mountain along the borders of the Colorado desert, between Van Deventer's and Palm canyon, altitude 4000 feet, *Hall 1852;* Coyote canyon, Santa Rosa mountain, altitude 5000 feet, *Hall 1180, 2127* (type).

3. **Monardella cinerea** sp. nov.

Stem slightly woody at base, freely branching, branches spreading, 1 dm. or less in length, cinereous: leaves sessile, 5 to 8 mm. long, broadly ovate-triangular, obtuse at apex, abruptly rounded at base, denticulate, cinereous on both surfaces with soft villous tomentum, lateral veins in 2 pairs: floral pair of leaves similar, closely subtending heads: bracts broadly ovate, acute or obtuse, 8 mm. long, purple, faintly veined, sparsely villous pubescent: heads 15 to 20 mm. broad, many flowered: calyx 7 mm. long, purple tinged, tube villous pubescent and glandular, teeth subulate, 2 mm. long, villous within: corolla tube not exserted, lobes 4 mm. long: lower stamens slightly exceeding lobes, a third longer than upper pair.

In general aspect suggesting some form of *nana*, but belonging according to floral characters to the *Pycnanthae* section, and most closely related to the next, from which it is readily distinguished by the character of the pubescence.

Type: Mount San Antonio, at about 9000 feet altitude, *Abrams 1928*, July 24, 1901. The type specimen is in the Dudley Herbarium.

Distribution: Known only from near the summit of Mt. San Antonio.

Specimens examined: Near the summit of Mt. San Antonio, *Abrams 1928; Mrs. H. E. Wilder*, August 1, 1905.

4. **Monardella australis** sp. nov.

Perennial from a woody rootstock, branches decumbent, 1 to 1.5 dm. long, villous and pubescent: lower leaves reduced, entire or remotely denticulate; cauline of 4 to 5 pairs, oblong-lanceolate, mostly 15 mm. long, 6 mm. broad, thin, pale and somewhat grayish-green with villous pubescence; lateral veins evident, in 3 pairs: bracts ovate or broadly acuminate, 12 to 15 mm. long, membranaceous, light green tinged with pink, sparsely villous and glandular: calyx 8 mm. long, sparsely pubescent, its teeth subulate, 1.5 mm. long: corolla tube equaling or slightly exceeding calyx, pubescent, lobes about 5 mm. long: lower stamens a third longer than lower corolla lobes.

This is probably the most southern representative of the *odoratissima* group. It is readily distinguished from true *odoratissima*, which was described from plants collected by Douglas "in petrosis ad flumen Columbia et in rupibus alpestribus in montibus White Montibus," by the acuminate instead of rounded bracts, as well as by foliage and habit. The last two collections cited below approach *epilobioides*, and eventually a large series may form a complete intergradation between these two, and through the variety of *epilobioides* connect up, by an unbroken chain, the *odoratissima* and *linoides* groups.

Type: Tamarack valley, altitude 9200 feet, San Jacinto mountains, *Hall 2486*, July, 1901. The type specimen is deposited in the Dudley Herbarium.

Distribution: Open coniferous forests of the San Jacinto and San Bernardino mountains from 6000 to 10000 feet altitude.

Specimens examined: San Jacinto mountains, *Hall 713, 2486;* San Bernardino mountains, *S. B. & W. F. Parish 462;* Bear valley, altitude 6000 feet, *Hall*, July, 1899; Deer creek; *Abrams 2046.*

5. MONARDELLA EPILOBIOIDES Green, Pittonia **5:** 85. 1902.

Monardella linoides stricta Parish, Erythea **7:** 96. 1899.

Madronella epilobioides Greene, Leaflets **1:** 169. 1906.

Perennial from a woody rootstock, 1 to 2 dm. high: branches erect or decumbent, light green, with short retrorsely spreading pubescence of slender, 2-celled hairs. Leaves oblong-linear, obtuse, entire, firm, only the midvein evident, bright glaucous green, appearing glabrous, but minutely and sparsely pubescent under a lens: heads 12 to 15 mm. broad: bracts ovate-lanceolate, 10 mm. or less in length, acute or short acuminate, membranaceous, rose-purple: calyx 6 mm. long, nearly glabrous except villous inner surface of teeth: corolla tube well exserted, 8 mm. long: stamens very unequal, filaments glabrous except at base.

The type specimen of *epilobioides* was distributed by Mr. Parish with the following label: "*Monardella linoides*, var. *stricta* Parish (ined.), Bear Valley, San Bernardino Mountains, altitude 6500 feet, *S. B. Parish*, June, 1894." This specimen is a very good match for the type of Parish's variety, which was collected at the same place ten years before.

Type locality: "Bear Valley, at the eastern base of the San Bernardino Mountains, California." Bear valley is not "at the base of the mountains," but at an altitude of 6700 feet.

Distribution: Coniferous forests of the Canadian and Transition zones of the San Bernardino mountains.

Specimens examined: Bear valley, San Bernardino mountains, *Parish 2077*, and June, 1894, *Shaw & Illingworth 203;* Bluff lake, San Bernardino mountains, *Pettibone*, August, 1895; Hathaway Flat, San Bernardino mountains, altitude 6000 feet, *Abrams & McGregor 805;* Santa Ana canyon, San Bernardino mountains, altitude 6100 feet, *Grinnell*, July 27, 1906; same, altitude 8500 feet, *Hall 7578*.

5a. MONARDELLA EPILOBIOIDES **erecta** var. nov.

Resembling the typical form in foliage and pubescence: stems taller: bracts green or only faintly tinged with purple: corolla throat copiously villous within below insertion of each stamen: filaments villous below middle.

Strikingly different from the species in extreme forms, but intergradations are abundant. The more robust specimens certainly suggest a close relationship to the *linoides* group. This is especially true of the specimens from the San Antonio mountains.

Type: On dry ridges, Bear valley, San Bernardino mountains, altitude 6700 feet, *Abrams 2861*, August 3, 1902. The type specimen is in the Dudley Herbarium.

Distribution: Open coniferous forests of the San Bernardino and San Antonio mountains.

Specimens examined: San Antonio mountains, altitude 7000 feet, *Hall*, July, 1896; San Antonio mountains, Swartout canyon, altitude 6700 feet, *Hall 297;* Green valley, San Bernardino mountains, *Shaw* & *Illingworth 202;* Bear valley, San Bernardino mountains, *Abrams 2861*.

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A new edition of the Catalog of North American Plants is in preparation. Thus far 140 pages have been printed, and other parts will follow as fast as possible. In all there will be about 300 pages. Since a considerable time must elapse before the work can be completed, the 140 pages and other parts as soon as issued, will be sent to those who wish to have them in that form, for $1.25, payment to be sent with the order.

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A. A. Heller,

539 West 5th street, Reno, Nevada

Volume 8 Number 4

MUHLENBERGIA

APRIL, 1912

Editors: A. A. HELLER and P. BEVERIDGE KENNEDY

Hulsea algida Gray

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University of Nevada,
Reno, Nevada

Volume 8 April 25, 1912

MUHLENBERGIA

THE MONARDELLAS OF SOUTHERN CALIFORNIA—II

BY L. R. ABRAMS

6. MONARDELLA VIMINEA Greene, Pittonia **5:** 85. 1902.

Madronella viminea Greene, Leaflets **1:** 169. 1906.

Stems woody at base, about 6 dm. high, glaucous green, finely puberulent: leaves narrowly linear-lanceolate, 2 to 4 cm. long, glaucous green, clothed with fine comparatively sparse puberulence, this upwardly appressed on upper surface, oil ducts thickly crowded on lower surface: bracts ovate-lanceolate, greenish, tinged with rose-purple: calyx pubescent, villous on the triangular-subulate teeth.

Type locality: "From some unrecorded locality in the mountains of San Diego Co., California."

Distribution: Foothills on the coastal slope of San Diego county.

Specimens examined: San Diego county, locality not given, *Vasey 491* (type); Poway, *Susan G. Stokes*, August, 1895; McCoon's ranch, near Poway, *Parish 4421;* San Diego, *Brandegee*, May 21, 1894.

7. MONARDELLA LINOIDES A. Gray, Proc. Am. Acad. **11:** 101. 1876.

Madronella linoides Greene, Leaflets **1:** 169. 1906.

Perennial from a woody base, 3 to 5 dm. high: branches silvery with very fine, almost imperceptible, retrorsely appressed puberulence: leaves 15 to 20 mm. long, linear or linear-oblong, entire, thick, veins not evident, silvery with very minute puberulence composed of triangular 1-celled hairs, those on upper surface upwardly appressed or curved: bracts broadly ovate, or acut-

MAY 1 - 1912

ish, about 1 cm. long, membranaceous, pale: calyx 8 mm. long, puberulent, villous on the short, triangular-subulate teeth.

Type locality: "S. California, in the mountains east of San Diego, Dr. Palmer." This is number 261 of Palmer's 1875 collections, and according to his field notes was collected at "Oriflamme Mine," which is situated in Oriflamme canyon on the desert slopes of the Cuiamaca mountains about five miles east of Cuiamaca lake.

Distribution: Western borders of the Colorado desert in the juniper and pinyon belt, or rarely extending into the yellow pine belt.

Specimens examined: Big Morongo canyon, altitude 3000 feet, *Parish 3009;* Tauquitz valley, San Jacinto mountains, altitude 7000 feet, *Hall 2430;* twenty miles south of Palm Springs, *Hall 758;* Coyote canyon, Santa Ana mountains, *Hall 2137;* Oriflamme canyon, *Palmer 261*, *Abrams 3932;* Laguna mountains, *Orcutt*, July, 1889.

8. MONARDELLA OBLONGA Greene, Pittonia **5:** 83. 1902.

Madronella oblonga Greene, Leaflets **1:** 169. 1906.

Stems woody at base, 2 to 4 dm. high: herbage silvery canescent throughout with dense appressed puberulence: leaves oblong, 15 to 20 mm. long, rounded at the slightly tapering apex, upper surface with retrorsely appressed, subulate, 1-celled hairs: bracts broadly ovate, acute or shortly acuminate, membranaceous, pale or tinged with rose-purple, 9 to 12 mm. long: calyx 9 mm. long, pubescent and glandular, lobes and sinuses with stiff spreading hairs: corolla apparently pale rose-purple.

I have not seen the type of *oblonga*, but from the description and distribution there seems little doubt that the plants here described belong to that species.

Type locality: "In the mountains south of Tehachapi, California."

Distribution: In the pinyon and lower altitudes of the yellow pine belts of the mountains bordering on the Mojave desert, from Mt. Pinos to the Panamint mountains, and on the western slope of the Sierra Nevada in Kern county.

Specimens examined: North Fork, Mt. Pinos, altitude 6000 feet, *Hall 6461;* north slope of Mt. Pinos, *Hall 6405;* Mt. Pinos, *Grinnell 16;* Mt. Frazier, *Elmer 3952;* Argus Peak on rocky slopes, *Purpus 5089;* Wild Rose canyon, Panamint mountains, *Coville & Funston 2045*.

9. MONARDELLA HYPOLEUCA A. Gray, Syn. Fl. **2:** pt. 1, 356. 1878.

Monardella robusta Elmer, Bot. Gaz. **39:** 46. 1905.

Madronella hypoleuca Greene, Leaflets **1**: 116. 1906.

Stems tufted, woody at base, 3 to 5 dm. high, more or less tomentose: leaves ovate-oblong, 2 to 4 cm. long, obtuse, entire, slightly revolute, densely white tomentose beneath, glabrous and shiny above, veins evident, impressed on upper surface: bracts broadly ovate, obtuse, 1 cm. long, tomentose, calyx villous, its teeth triangular-subulate: coralla pale.

Type locality: "S. E. California, San Bernardino Co."

Distribution: Coastal mountains of southern California from Santa Barbara to Orange county.

Specimens examined: Rattlesnake canyon near Santa Barbara, *Elmer 3728;* Mountain Drive, Santa Barbara, *Abrams 4149;* Topango canyon, Santa Monica mountains, *Hasse*, January, 1906; San Juan Hot Springs, *Nevin*, 1882.

10. **Monardella lanata** sp. nov.

Stems tufted, woody at base, 2 to 4 dm. high, villous pubescent: leaves narrowly oblanceolate, appearing linear on account of the strongly revolute margins, 15 to 30 mm. long, sessile or short petioled, with shorter ones fascicled in their axils, soft villous above, hoary beneath with a dense tomentum, thick, lateral veins not at all evident: heads about 2 cm. broad: bracts ovate-lanceolate, herbaceous, villous, equaling the calyx: calyx 8 mm. long, 10-nerved, villous throughout, teeth triangular-subulate, 1.5 mm. long: corolla white, tube 10 mm. long, pubescent, lobes 4 mm. long: filaments sparsely pubescent.

Related to *hypoleuca*, from which it is distinguished by the much narrower and thicker leaves, the absence of lateral impressed veins, and the villous pubescence on the upper surface of the leaves.

Type: Descanso grade, near the top, Cuiamaca mountains, San Diego county, *Brandegee*, July 19, 1906. The type is sheet no. *104626* of the University of California herbarium.

Distribution: Western slopes of the southern part of the Cuiamaca mountains southward, probably extending into Lower California.

Specimens examined: Descanso grade, *Brandegee*, July 19, 1906; Potrero mountains, *Orcutt 996*.

11. MONARDELLA CRISPA Elmer, Bot. Gaz. **39:** 46. 1905.

Stems woody below, much branched, 3 dm. high, young branches villous pubescent: leaves oblanceolate, 2 to 5 cm. long, rounded at apex, tapering to the slender petiole, sparsely pubescent, somewhat succulent, undulate on the margin: bracts broadly ovate, rounded or the inner acute, membranaceous between the 7 or 8 parallel veins: calyx 6 mm. long, villous, its triangular teeth rather blunt at the apex: corolla purple, tube not exserted: stamens well exserted.

This species is a very near relative of *undulata*, being distinguished chiefly by its stouter perennial habit, and pubescence.

Type locality: "Surf, Santa Barbara County, California," where it is "confined to the drifting sand beaches."

Distribution: Known only from the vicinity of Surf, Santa Barbara county.

Specimens examined: Surf, *Elmer 3965*.

12. MONARDELLA UNDULATA Benth. Lab. Gen. et Sp. 332. 1834.
Madronella undulata Greene, Leaflets **1:** 169. 1906.

Stems erect, usually much branched, 2 to 3 dm. high, puberulent: leaves oblanceolate, 3 cm. long or less, thickish, dark green, sparsely puberulent, margins strongly undulate: bracts broadly ovate, 10 mm. long or less, acute or mucronate, veins and margin green, otherwise thin and scarious, villous pubescent: calyx villous pubescent, its teeth triangular: corolla deep purple.

Type locality: "In California septentrionali." First collected by Douglas, presumably near Monterey.

Distribution: A coastal species of central California, extending from Point Reyes to the northwestern part of Santa Barbara county, probably not occurring within our limits, that is, south of Point Conception.

Specimens examined: Santa Barbara county, no locality given, *M. S. Baker*, July, 1895.

13. MONARDELLA LANCEOLATA A. Gray, Proc. Am. Acad. **11:** 102. 1876.

Monardella sanguinea Greene, Pittonia **5:** 86. 1902.
Madronella lanceolata Greene, Leaflets **1:** 169. 1906.
Madronella sanguinea Greene, Leaflets **1:** 169. 1906.

Stems more or less puberulent, usually simple below, 1 to 5 dm. high: leaves lanceolate-oblong, 25 to 40 mm. long, tapering into a slender petiole, green and glabrous or minutely puberulent: bracts ovate to ovate-lanceolate, acute, herbaceous or more or less tinged with purple, lateral veins usually prominent, sparsely and minutely scabrous, especially on veins: calyx teeth triangular-subulate, villous within, sparsely pubescent without and more or less hispid with spreading hairs at sinuses: corolla rose-purple.

This handsome and very fragrant species has a wide range and exhibits considerable variation. An extreme form was recognized by Gray as variety *microcephala*, which seems to possess characters worthy of specific distinction, but the examination of a large series of specimens (35 sheets) from southern California, clearly shows a complete intergradation. I have not seen the type of Greene's *sanguinea*, which was collected "near Julian" by G. W. Dunn "in 1881 and 1888," but there is a specimen of Dunn's answering Greene's description, before me which was collected at Julian in 1892. This seems to be one of the intermediate stages between true *lanceolata* and the variety *microcephala*.

Type locality: Only the general range, "California, from Plumas to San Diego Co.," was given in the original publication, and no collections were cited.

Distribution: Upper Sonoran and Transition zones of the Sierra Nevada from Butte county southward. In southern California it is found through the Transition and Upper Sonoran zones of the mountains and on the foothills and sandy plains as far south as Riverside and Orange counties. Along the southern border of its range, especially in the San Jacinto and Cuiamaca mountains, intergradation between the typical form and the variety becomes evident.

13a. MONARDELLA LANCEOLATA MICROCEPHALA A. Gray, Syn. Fl. ed. 2, **2:** pt. 1, 459. 1886.

Monardella peninsularis Greene, Pittonia **5:** 87. 1902.

Madronella peninsularis Greene, Leaflets **1:** 169. 1906.

Inflorescence strongly divaricate, branched: leaves scabrous above: heads 10 to 12 mm. broad: bracts ovate, about 6 mm. long: calyx sparsely pubescent with ascending hairs, teeth triangular-subulate, without hispid hairs at base: corolla lobes 5 to 6 mm. long.

Type locality: "Potrero, near San Diego."

Distribution: In the valleys and foothills of San Diego county, extending southward into adjacent Lower California.

Specimens examined: Tigh's ranch, San Diego county, *Palmer 294;* Potrero, *Susan G. Stokes*, July, 1895; Pine valley, *Orcutt*, July, 1899; *Mearns 3983;* Cameron's ranch, Laguna, *Mearns 3692;* near San Diego, *Palmer 257;* Hansen's ranch, Lower California, *Orcutt 929.*

14. MONARDELLA PRINGLEI A. Gray, Proc. Am. Acad. **19**: 96. 1883.

Madronella Pringlei Greene, Leaflets **1:** 169. 1906.

Stems erect, branching near base, puberulent: leaves lanceolate, 35 mm. long or less, puberulent, narrowed to a short petiole: bracts broadly ovate, abruptly accminate, 8 to 10 mm. long, villous pubescent: calyx teeth narrowly triangular-subulate, villous pubescent without: corolla rose-purple.

Type locality: "Sandy ridges, near Colton, San Bernardino Co., S. E. California, Pringle."

Distribution: Apparently one of the most local species, found only in the vicinity of Colton, in the San Bernardino valley.

Specimens examined: Sandy ridges near Colton, *Pringle*, May 23, 1882; *Parish 6396.*

15. **Monardella Elmeri** sp. nov.

Stems erect, branching from the base, puberulent: leaves lanceolate to narrowly ovate, 25 mm. long or less, narrowed to a short petiole, somewhat cinereous with a fine puberulence: bracts broadly ovate, abruptly acuminate, 12 mm. long, sparsely scabrous, green below, becoming membranous above and tinged with rose-purple, midvein dividing near base into about 8 parallel lateral veins: calyx 7 mm. long, sparsely short pubescent with spreading hairs, 15-nerved, teeth narrowly triangular-subulate, 2 mm. long, sparsely short pubescent without, villous within, herbaceous throughout or tinged wiih rose-purple: corolla rose-purple, slightly exceeding calyx, sparsely short pubescent, lobes 4 mm. long.

This species is intermediate in habit between *Pringlei* and *exilis.* From the former it is best distinguished by the character of the pubescence on the bracts and calyx, and from the latter by the herbaceous instead of hyaline tipped calyx teeth.

Type locality: Acton, Los Angeles county, *Elmer 3681*, June, 1902. The type specimen is in the Dudley Herbarium.

Distribution: Known only from the type locality.

16. MONARDELLA EXILIS (A. Gray) Greene, Pittonia **5**: 86. 1902.

Monardella candicans exilis A. Gray, Syn. Fl. **2**: pt. 1, 358. 1878.

Madronella exilis Greene, Leaflets **1**: 169. 1906.

Stems erect, simple or branching below, 2 to 3 dm. high, sparsely puberulent: leaves broadly to narrowly lanceolate, 3 cm. long or less, puberulent: bracts broadly ovate, abruptly acuminate, 10 cm. long or less, veins all about equally prominent, greenish, margins white-scarious: calyx teeth narrowly triangular-subulate, white-scarious on margin and tip, villous pubescent without.

Type locality: "S. E. California or adjacent Arizona." This was collected by Palmer (*364*) in 1876 on the Mojave river, according to the type specimen in the Gray Herbarium.

Distribution: Upper end of the San Joaquin valley and in the western part of the Mojave desert.

Specimens examined: Mojave river, *Palmer 364* (type); dry sands, Mojave desert, *Pringle*, May 17, 1882; Lancaster, *Dudley & Lamb 4302;* Palmdale, *Elmer 3648;* Burcham's ranch, Mojave river, *Parish 4909;* near Mojave station, *Hall 7382;* sandy places in Walker's Pass, *Purpus 5347*.

In the preparation of this paper I am greatly indebted to Dr. J. N. Rose for the loan of all the southern California specimens in the National Herbarium; to Dr. H. M. Hall for those in the herbarium of the University of California; to Mr. S. B. Parish and Dr. A. Davidson, for material in their private herbaria, and to Dr. M. L. Fernald and Dr. P. A. Rydberg for notes on type specimens in the Gray Herbarium and the Torrey Herbarium respectively.

Stanford University, California.

NEW PLANTS FROM COLORADO

By George E. Osterhout

Cogswellia concinna sp. nov.

Perennial from a long fleshy root: a cluster of leaves and usually several peduncles borne at the summit of a short stem, this having some leaves at its base: leaves sheathing at base, 1 dm. or more long, about half the length being the petiole, pinnate with three or four pairs of oblong leaflets more or less divided, or some of the lower leaves bipinnate: peduncles much exceeding the leaves, the longer ones 2 dm. long, dividing into a 5 to 10-rayed umbel, the rays 2 to 4 cm. long: involucre a rather indistinct scarious sheath, sometimes bearing linear bracts: involucel a single foliaceous bractlet divided into several oblong parts: flowers numerous, yellow: carpels oval, 7 to 8 mm.

long by 6 mm. wide, lateral wings broad, the dorsal ribs usually one and two, filiform; oil tubes numerous and small, 8 to 15 on the commissure, 5 to 10 in the intervals.

Collected at Paeonia, Delta county, Colorado, May 21, 1911, no. *4515*. It was quite plentiful on the hills on the south side of the railroad, and at the time collected was in good fruit, tho still flowering.

GNAPHALIUM DECURRENS **glandulosum** var. nov.

Stem 3 to 4 dm. high, glandular pubescent below, becoming woolly near the top and on the branches: leaves green on both surfaces and shortly glandular pubescent, decurrent on the stem: corymbosely branched at the top and bearing numerous heads, these woolly at base, the white involucral bracts somewhat acuminate and becoming rusty tinged in age, as is the pappus.

Differs from *Gnaphalium decurrens* Ives, by having less tomentum on the stem, and the leaves green on both surfaces.

The type specimen was collected in Estes Park, Larimer county, Colorado, August, 1895, no. *547*; collected also at Sulphur Springs, Grand county, Colorado, August 8, 1907, no. *3584*.

NEW COMBINATION

Nuttallia multicaulis

Touteria multicaulis Osterhout, Bull. Torr. Club **30**: 236. 1903.

Windsor, Colorado.

ALPINE PLANTS—VIII.

By P. Beveridge Kennedy

Alpine Dandelion

Hulsea algida Gray, Proc. Am. Acad. **6**: 548. 1865.

Hulsea caespitosa Nelson and Kennedy, Proc. Biol. Soc. Wash. **19**: 38. 1906.

One is amazed when first encountering this large yellow flowered plant seemingly growing in an impossible situation among masses of loose volcanic rocks. Closer investigation shows, however, that its long stout dandelion-like root extends for a considerable distance down into good soil. The leaves are well protected when young with a cottony wool and later by a dense clothing of glandular hairs.

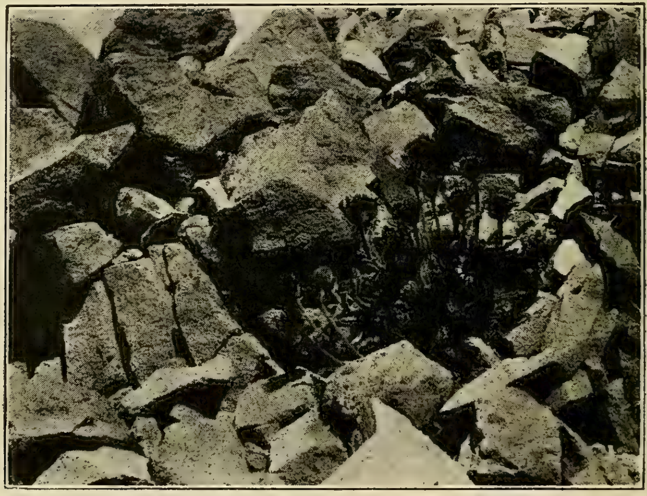

Figure 3. *Hulsea algida* Gray

The original description is somewhat confusing in the statement that the heads are "an inch in diameter." When fully expanded, including the rays, they are two inches wide.

The terms stems, peduncles and leafy stems are also misleading as applied to the different species. The plant is composed of several tufts of radical leaves from the center of which emerges a leafy bracted peduncle terminating in a single head. There are about six foliaceous bracts on each peduncle, the lowest three inches long, and the uppermost close to the head half an inch long. Differing in these points from the then available descriptions of *H. algida*, Professor Nelson and myself were led to believe our plant to be a new species, and named it *Hulsea caespitosa*.

The species was first collected by Brewer on Mt. Dana at 11500 feet, and by Bolander and Muir on the higher summits of the Sierra Nevada mountains. Rothrock is reported to have collected it on Mt. Whitney at 13700 feet.

The collection from which our photograph was taken was from the summit of Mt. Rose, Washoe county, Nevada, *Kennedy*, August 17, 1905. Other collections from the same place are by *Brown* and *Heller*. These are the only collections from Nevada that we know of at the present time.

NEW COMBINATIONS—VIII.

By A. A. Heller

Draba ammophila

Draba Helleri Small, Fl. Southeast. U. S. 479. 1903; not *Draba Helleriana* Greene, Pittonia **4**: 17. 1899.

Dipetalia ruderalis (Nutt.)

Ellimia ruderalis Nutt.; T. and G. Fl. N. A. **1**: 125. 1838.

Oligomeris ruderalis Nelson and Kennedy, Muhlenbergia **3**: 138. 1908.

Anisolotus argyraeus (Greene)

Hosackia argyraea Greene, Bull. Cal. Acad. **1**: 184. 1885.

Lotus argyraeus Greene, Pittonia **2**: 144. 1890.

Anisolotus grandiflorus (Benth.)

Hosackia grandiflora Benth. Trans. Linn. Soc. **17**: 366. 1836.

Lotus grandiflorus Greene, Pittonia **2**: 145. 1890.

Anisolotus leucophaeus (Greene)

Lotus leucophaeus Greene, Pittonia **2**: 145. 1890.

Hosackia grandiflora var.? *anthyloides* Gray, Proc. Phila. Acad. **1863**: 350. 1863.

Anisolotus macranthus (Greene)

Hosackia macrantha Greene, Bull. Cal. Acad. **1**: 81. 1885.

Lotus macranthus Greene, Pittonia **2**: 146. 1890.

Anisolotus maritimus (Nutt.)

Hosackia maritima Nutt.; T. and G. Fl. N. A. **1**: 326. 1838.

Lotus salsuginosus Greene, Pittonia **2**: 140. 1890.

Chamaesyce Rafinesquii (Greene)

Euphorbia Rafinesquii Greene, Pittonia **3**: 207. 1897.

Euphorbia hirsuta Wiegand, Bot. Gaz. **24**: 50. 1897; not *E. hirsuta* Schur. 1853, or *E. hirsuta* Kit. 1866.

Euphorbia hypericifolia var. *hirsuta* Torr. Fl. N. and Mid. States 331. 1826.

Chamaesyce hirsuta Arthur, Torreya **11**: 260. 1912.

Cryptanthe decipiens (Jones)

Krynitzkia decipiens Jones, Cont. West. Bot. **13**: 6. 1910.

This species was reported from Nevada by Jones in the publication cited above. Two other stations may now be added—*Kennedy 1838*, from Logan, Clark county, and *Heller 9632*, Rhyolite, Nye county. Both collections were made early in May, 1909. The species is evidently widely distributed in the southern part of the state.

Mohavea confertiflora (Benth.)

Antirrhinum confertiflorum Benth. in DC. Prodr. **10**: 592. 1846.

Mohavea viscida Gray, Pac. R. R. Rep. **4**: 122. 1857.

This rare plant may now also be credited to the flora of Nevada, for it was collected in the extreme southwestern point of the state near the Colorado river in March, 1911, by Mr. W. W. Robbins, of the Colorado Agricultural College.

AMERICAN FERN JOURNAL

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A. A. Heller,
539 West 5th street, Reno, Nevada

Volume 8 Number 5

MUHLENBERGIA

MAY, 1912

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Editors: A. A. Heller and P. Beveridge Kennedy

Ribes inebrians Lindl.

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University of Nevada,
Reno, Nevada

Volume 8 May 31, 1912

MUHLENBERGIA

THE FLORA OF THE RUBY MOUNTAINS—V

By A. A. Heller

Continued from page 24.

After a climb of about one hundred feet above the canyon proper, the axis of the main range was attained at 10300 feet. As is the case at the head of nearly all of the canyons, this was not the highest point in the immediate vicinity, but a "saddle" between two high points, one of which ran up to at least 11000 feet, but was not visited on account of the approach of midafternoon and a disinclination on my part to climb higher.

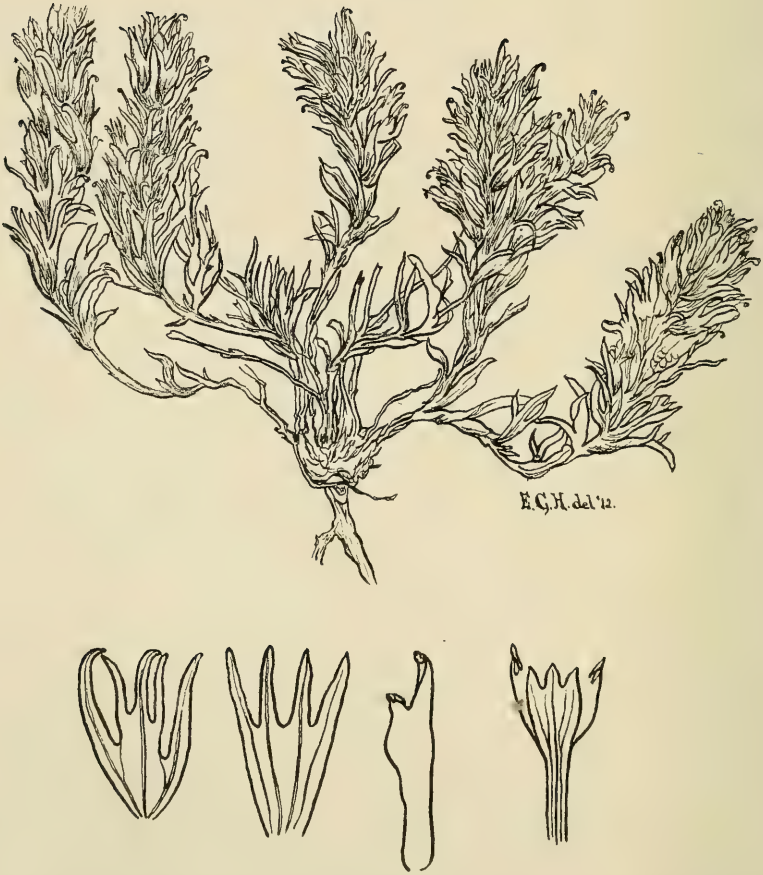
The ground about this point is decidedly barren, the only plants being low, stunted forms, and not many of them at that. At the crest, among the rocks, *Ivesia setosa* was plentiful, its short and thick stems rising from crevices wherever a little soil had collected. Here was also found an undescribed *Castilleja.*

Castilleja lapidicola n. sp.

Perennial, pubescent throughout with short, white tangled hairs: stems several from a slender perpendicular tap root, including the inflorescence 1 dm. high or less, decumbent, the inflorescence erect, the whole presenting a candelabra-like appearance, leafy: leaves 15 mm. long or less, the lowermost especially narrow, 1 to 2 mm. wide, bearing a pair of linear, divaricate lobes near the middle, 1 to 3-nerved, according to whether the leaf is simple or lobed, merging into floral bracts, which are purplish, cuneate in outline, the 3 lobes often further 2 to 3-lobed, their apices usually inrolled, more or less terete: inflorescence 7 cm. long or less, commonly 2 or 3 times the length of the stems: calyx 15 or 16 mm. long, a little deeper cleft in front than behind, the linear-lanceolate lobes nearly equal, cleft for

N 7 - 1912

Plate 5



Castilleja lapidicola Heller. Enlargements, reading from left to right: Floral bract; calyx laid open; corolla; lower corolla lip laid open, with stamens attached.

6 or 7 mm.: corolla purplish, 18 mm. long, upper lip 5 mm. long, straight, acute, the lower 3 mm. long, moderately gibbous, 2 mm. wide, the broadly lanceolate lobes 1 mm. long, the lateral ones slightly incurved at apex: pod 11 mm. long, 5 mm. wide at the middle: seeds 2 mm. long, 1 mm. wide, shining, pitted.

The type, in the herbarium of the Nevada Agricultural Experiment Station, is *Heller 9390*, collected August 11, 1908, at the head of the middle canyon of the South Fork of the Humboldt, above Lee post office, Elko county, Nevada, at an elevation of 10300 feet. The plants were growing on a bare slope almost devoid of vegetation, the surface closely packed with small stones and showing very little soil.

This species somewhat resembles *C. puberula* Rydb. from Colorado, but is much smaller, more pubescent, and has a very different flower. So far it and *C. inconspicua* Nelson and Kennedy, of western Nevada, are the only representatives of the group noted from the state.

After spending several days about Lee post office, another trip to the mountains being prevented by a rain storm at the lower elevations and snow in the mountains, we started on the morning of August 17th for Cave Creek in Ruby valley, on the east side of the range. A rain storm about midafternoon caused us to stop for the night at Toyn's, at the western entrance to Harrison pass, the Fremont pass of the King Report.

While Mr. Toyn's ranch, like all the others in the neighborhood, is chiefly devoted to the growing of hay, he has a large vegetable garden wherein are also bush fruits such as raspberries and currants, and an orchard containing pear, apple, cherry and plum trees. Fair crops of fruit are usually obtained from these trees. The elevation is 5700 feet.

The summit of Harrison pass lies at an elevation of 7000 feet, the formation granite. At places along the road, especially in the lower half of the ascent and below the granite, numerous springs seep out, and at several places small streams are crossed. Sheep have pastured extensively here, and many bare spots were in evidence. But few plants were obtained, one of the most interesting being a handsome white-woolly thistle which grew about one of the wet places. It is related to *Carduus ochrocentrus*, and is probably the *C. undulatus* of the King Report, said to be common throughout Nevada and Utah.

On the east slope, just before going down into Ruby valley a species of juniper, identified as *Sabina utahensis*, was fairly plentiful. It is a small tree ten to fifteen feet high with a short trunk and generally well rounded crown. The species is fairly common at low and medium elevations in the limestone formation of the southern part of the Ruby range.

Ruby valley, on the east side of the range, lies at an elevation of about 6000 feet. It is perhaps ten miles wide, and the western side especially is more or less devoted to hay ranches. Our maps show two fair sized bodies of water, Franklin and Ruby lakes, but these lakes are little more than marshes covered with a dense growth of tules, *Scirpus occidentalis*, so that scarcely any clear water surface is exposed.

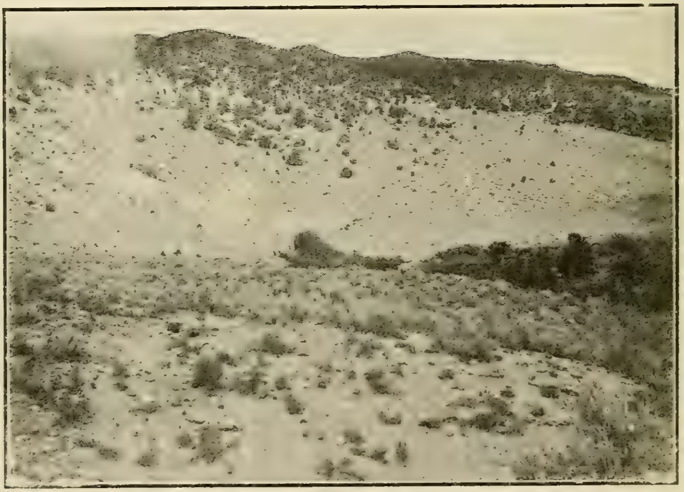


Figure 4. The source of Cave creek.

As mentioned in the first paper of this series, only two streams flow from the base of the mountains. The place where the larger of these, Cave creek, emerges from the range, is shown in the accompanying illustration. A sage brush covered area is always present between the base of the range and the meadow lands, and this is shown in the foreground, while on the right a line of willows and cottonwoods marks the course of Cave creek. In the background is shown the sage brush covered lower slope of the mountain, the higher parts dotted with juniper and mountain mahogany, while the highest peaks dimly shown in the distance are generally without tree growth.

Camp was established at the ranch of Dr. Hager, about a mile below Cave creek, and three days were spent exploring the region. The dry sage brush area along the base of the ridge yielded *Chenopodium leptophyllum*, *Myzorrhiza multiflora*, *Lygodesmia spinosa*, *Gutierrezia diversifolia* and *Solidago pulcherrima*, while in the meadows in soil containing but little alkali the following were found:

Carex nebrascensis
Scirpus occidentalis
Astragalus nitidus
Chamaenirion angustifolium
Glaux maritima .
Amarella strictiflora
Anthopogon detonsa
Mimulus Langsdorfii
Lactuca pulchella
Aster oxylepis
Solidago missouriensis

Several alkaline areas produced by far the greater number of species found in the low land. They were:

Triglochin maritima
Agropyron tenerum
Distichlis dentata
Elymus triticoides
Spartina gracilis
Sporobolus filiformis
Scirpus campestris
Atriplex truncata
Chenopodium glaucum
Dondia occidentalis
Nitrophila occidentalis
Sarcobatus vermiculatus
Rumex persicarioides
Radicula obtusa
Ivesia Kingii
Sium cicutaefolium
Heliotropium spathulatum
Crepis glauca
Brachyactis frondosa
Pyrrocoma subviscosa

On August 20th the ridge above camp was ascended to 9300 feet, the line of least resistance in the shape of a canyon being followed up to 7300 feet. In fact, there are not many places in the immediate vicinity where an ascent can be easily made, on account of the precipitous rim rocks or terraces.

Near the mouth of the canyon, at 6250 feet was found the beautiful *Pentstemon macranthus* recently described by Miss Eastwood, the *P. Palmeri* of Watson's list. The throat of the large flower is very little constricted, reminding one somewhat of the flower of the foxglove. The inside of the lower lip is beautifully striped with dark purple. Near by was the humble but sweet scented *P. deustus.*

In moist soil on the floor of the narrow canyon at 6400 feet *Scutellaria nevadensis* occurred sparingly. The type of this was collected in the same county (Elko), but many miles further north on the other side of the range. Golden clumps of *Petradoria pumila* were found at 6600 feet near trees, and two hundred feet higher *Amelanchier utahensis* fringed the banks.

An interesting find at 7950 feet was *Opulaster alternans*, never definitely reported except from the type locality, Schell Creek mountains, on the eastern border of the state.

At 7200 feet, where a little moisture made its appearance, *Eucephalus elegans* and *Artemisia incompta* were found. *Artemisia graveolens*, which much resembles *A. incompta*, occurred in a similar situation at 8800 feet, but in slate. Up to 8000 feet the formation is limestone, the canyon walls presenting many openings or caves. Above 8000 feet slate was the predominant formation.

Several clumps of *Stanleya collina* were found at the base of a limestone cliff at 7600 feet. That this is a distinct species there can be no doubt.

The scattered growth of vegetation on the higher parts of the range at this place is well shown in the accompanying illustration, from a photograph taken at 9000 feet. This is about the upper limit of the mountain mahogany, *Cercocarpus ledifolius.* At 9300 feet vegetation was even more scanty, the closely packed gravel and stones supporting a scattered growth of *Tetraneuris Torreyana*, *Hymenopappus cinereus*, *Sitanion rigidum*, and a few other plants. The summit of the ridge here lies at about 10500 feet, and with the exception of a few trees of *Pinus flexilis* at about 9800 feet, was bare and barren looking.

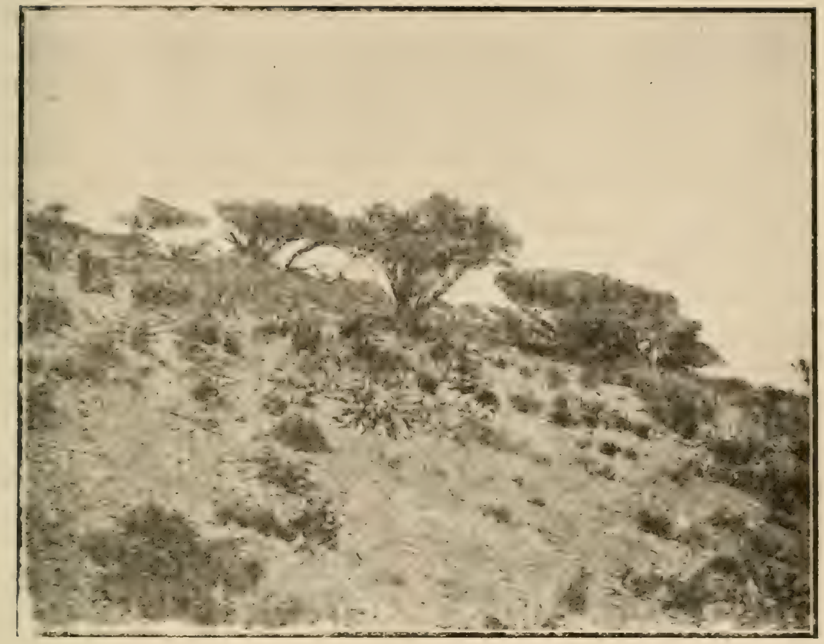


Figure 5. Open growth of vegetation on the ridge above Cave Creek

Of the thirty-three numbers collected, the following have been determined up to date:

Melica stricta
Sitanion rigidum
Eriogonum microthecum
Caulanthus crassicaulis
Physaria acutifolia
Stanleya collina
Homalobus junceus
Amelanchier utahensis
Opulaster alternans
Linum Lewisii
Nuttallia laevicaulis
Epilobium alpinum
Pachylophus marginatus
Sphaeralcea rivularis
Batanthes attenuata
Scutellaria nevadensis
Pentstemon deustus macranthus
Ptiloria exigua
Artemisia graveolens incompta
Chaenactis achillaefolia
Eucephalus elegans
Hymenopappus cinereus
Petradoria pumila
Tetraneuris Torreyana

Having returned to Lee post office, a trip up Rattlesnake canyon was undertaken on August 25th. The place proved true to its name, for immediately upon entering the canyon a large rattlesnake was found sunning itself near the trail. Needless to state, there was soon one snake less in the region.

With the exception of *Eriogonum Baileyi* and *Acrolasia integrifolia*, found at 6400 feet before the canyon was entered, no plants were collected until an elevation of 8500 feet was attained, where a fine clump of *Salix Scouleriana* was growing in a meadow along the stream.

At 8800 feet in a marshy place there was an abundance of *Veratrum californicum.* I was surprised to find this species so far east. It probably does reach the Rocky mountains, and is found in western Oregon, but in northeaatern Oregon, in the Blue mountains, is replaced by *V. Jonesii.* While classed as a poisonous plant, I have seen many plants in both California and Nevada that had been eaten off by sheep.

A beautiful form of *Mimulus Lewisii* was found at 8900 feet. The flowers were deep crimson. The form occurring in the Sierra Nevada has pinkish flowers with yellow in the throat. A plant referred to *Ligusticnm Cusickii* by Dr. Rose was also plentiful.

Near the head of the canyon are several small lakes, and about one of these was what Dr. Greene says is an undescribed Oreostemma, and a beautiful one it is, the flowers bright violet.

At about 9600 feet the canyon ends, and one encounters the main range. The summit of the saddle lies at 10100 feet. On the steep slope at 10000 feet *Smelowskia americana*, the strange looking *Senecio seridophyllus*, and a plant provisionally referred to *Oreochrysum Parryi* were found.

On the crest of the saddle about rocks was *Achillea lanulosa.* This would probably be referred by Dr. Rydberg to his *A. alpicola* on account of its low stature and dark margined involucral bracts. We have the same thing, but two or three times taller, from near Reno, collected at 8000 feet. Both have very broad, notched ray flowers. Until better characters are assigned to *alpicola* than small size and dark margined bracts, as opposed to larger size and light margined bracts in *lanulosa*, I can not separate it.

Passing along the saddle, the ascent of the high point on the north side was undertaken. On the way clumps of *Senecio cymbalarioides* with golden masses of flowers were found about rocks, and near by a handsome pale yellow flowered plant that has undergone many vicissitudes at the hands of botanists. I now intend to claim for it the rank of a genus, as Nuttall purposed to do many years ago. It is no more at home in either *Linanthus* or *Leptodactylon*, where it has recently been placed, than it is in *Gilia.*

Siphonella gen. nov.

Gilia § *Siphonella* Gray, Proc. Am. Acad. **8:** 266. 1870.

Siphonella Nuttallii (Gray)

Gilia Nuttallii Gray, Proc. Am. Acad. **8:** 266. 1870.
Linanthus Nuttallii Greene; Milliken, Univ. Cal. Pub. Bot. **2:** 54. 1904.
Leptodactylon Nuttallii Rydb. Bull. Torr. Club **33:** 149. 1906.

Since Gray described this in the place cited above, as well as in the Synoptical Flora under the section *Siphonella*, it is not necessary to repeat the description here. My impression of the plant is that it blooms in the day time, while all the species of *Leptodactylon* are nocturnal, opening early in the evening and closing the next morning. Their flowers also have a pleated appearance when closed, which is apparently not the case with those of *Siphonella.*

In damp soil about rocks at 10300 feet were *Drymocallis gracilis*, *Arnica mollis*, and *Epilobium obcordatum.* The latter is another of the species common also to the Sierra Nevada, but is found as far east as the Rocky mountains.

At 10850 feet, the highest point reached, *Pellaea Breweri* was found growing in crevices of the rocks. It is common in the Sierra Nevada, where it was first discovered.

Coming down from the high point, a beautiful Erigeron was found at 10200 in a moist meadow on the north side of the canyon. It was distributed as "*Aster glacialis* Nutt.," but is probably not that species, and does not seem to agree with any of those recently described by Greene, Leaflets **2**: 197-206.

The trip to Rattlesnake canyon was the last one, and though it yielded a comparatively small number of species, nearly all of them were of considerable interest.

During the six weeks spent on and about the Ruby mountains 552 numbers were collected. The entire range would no doubt yield not less than a thousand species if it were thoroughly explored. A number of species had undoubtedly bloomed and disappeared from the lower slopes, while the summits of the highest peaks should harbor many more. It is pretty certain that nearly every canyon contains a few species not found in adjacent ones. This I think can be shown by a comparison of the flora of Rattlesnake canyon with that of the middle canyon of the South Fork, separated by but one canyon, their heads close together.

While the greater number of the species found here seem to belong to the Rocky mountain flora, some few are local, and a small number are identical with species whose home is in the Sierra Nevada 350 miles to the westward, with no range of similar character intervening. The peculiar thing is that practically none of these species are found northward where the mountain systems merge more or less.

ALPINE PLANTS—IX

By P. Beveridge Kennedy

Alpine Currant

Ribes inebrians Lindl. Bot. Reg. *pl. 1471.* 1832.

We are glad to be able to illustrate from a photograph this much-named currant. The revision of the genus *Ribes* by Coville and Britton in North American Flora indicates that the plant has been given eight different names between the years 1832 and 1907, by about as many European and American botanists.

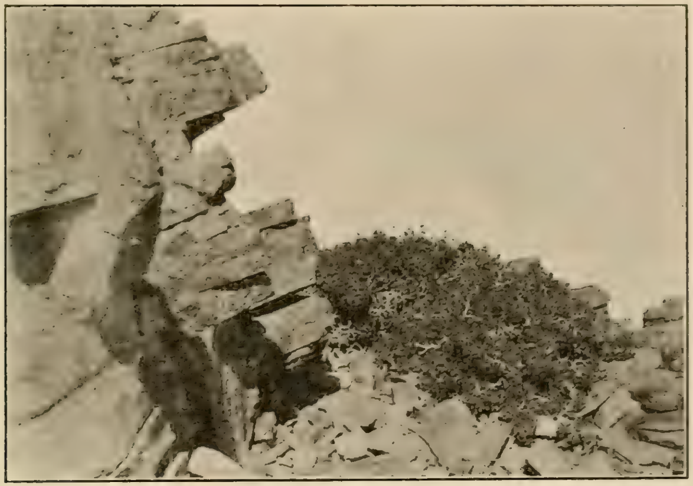


Figure 6. *Ribes inebrians* Lindl.

It is a remarkable shrub in that it occurs higher on the mountain than any other form of vegetation except lichens. The roots penetrate deeply into the crevices of the lava rocks, enabling it to withstand the fierce winds. The flowers, which appear in August, are white shading to pink, and the red berries, which are not especially palatable on account of their insipid taste and numerous seeds (9 to 14), are abundant in September. The photograph was taken on Mt. Rose, Washoe county, Nevada, at an elevation of 10800 feet.

NEW COMBINATIONS—IX.

By A. A. Heller

Micranthes odontoloma (Piper)

Saxifraga odontoloma Piper, Smiths. Misc. Coll. **50:** 200. 1907.

Saxifraga odontophylla Piper, Cont. U. S. Nat. Herb. **11:** 314. 1906; not Wahl.

Batidaea Egglestonii (Blanchard)

Rubus Egglestonii Blanchard, Torreya **7:** 140. 1907.

Anisolotus hirtellus (Greene)

Lotus hirtellus Greene, Pittonia **2:** 142. 1890.

Hosackia strigosa var. *hirtella* Hall, Univ. Cal. Publ. Bot. **4:** 198. 1912.

Anisolotus Mearnsii (Britton)

Hosackia Mearnsii Britton, Trans. N. Y. Acad. **8:** 65. 1889.

Lotus Mearnsii Greene, Pittonia **2:** 144. 1890.

Anisolotus mollis (Greene)

Hosackia mollis Greene, Bull. Cal. Acad. **1:** 185. 1885.

Lotus mollis Greene, Pittonia **2:** 143. 1890.

Anisolotus neo-mexicanus (Greene)

Lotus neo-mexicanus Greene, Pittonia **2:** 144. 1890.

Ditaxis californica (Brandegee)

Argithamnea californica Brandegee, Zoe **5:** 230. 1906.

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A. A. Heller,

539 West 5th street, Reno, Nevada

Volume 8 Number 6

MUHLENBERGIA

JUNE, 1912

Editors: A. A. Heller and P. Beveridge Kennedy

Chrysothamnus monocephalus Nelson and Kennedy

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University of Nevada,
Reno, Nevada

Volume 8 July 23, 1912

MUHLENBERGIA

THE NORTH AMERCAN LUPINES—VI.

By A. A. Heller

POLYPHYLLI Heller, Muhlenbergia **6**: 15. 1910.

My description of this section must be emended in one respect. The basal leaves are not always long petioled, for in certain members of the group, as *L. procerus*, they are short, only 1 dm. long. The stems are simple. Agardh, Synopsis 16, describes a tribe Polyphylli, but includes in it such species as *minimus* and *lepidus*, which are not at all related to *polyphyllus*. He also puts here *latifolius* and *cytisoides*, but these in my opinion should go into another section.

The Polyphylli as a whole are moisture loving plants, and are commonly found in swampy places, in moist meadows, or on stream banks close to the water. *L. polyphyllus* itself often acts at variance with this rule, growing on grassy slopes away from water, but it occurs in a region where there is an abundant rainfall, and apparently does not need the extra moisture. The members of this section are widely distributed, occurring from the immediate vicinity of the Pacific coast to the Rocky mountain region. The following species belong to this section:

LUPINUS APODOTROPIS Heller, Muhlenbergia **7**: 14. 1911.
Eastern Oregon.

Lupinus barbatus (Henderson)
Lupinus ligulatus barbatus Henderson, Bull. Torr. Club **27**: 345. 1900.

The type of this plant, in the Gray Herbarium, is certainly distinct from *L. ligulatus*. Southern Oregon.

JUL 30 1912

LUPINUS BURKEI Wats. Proc. Am. Acad. **8**: 525. 1873.
"Snake country (Burke)."

LUPINUS ELONGATUS Greene, Muhlenbergia **6**: 17. 1910.
Western Nevada.

LUPINUS GRANDIFOLIUS Lindl.; Agardh, Syn. 18. 1835.
Lupinus magnus Greene, Pittonia **3**: 160. 1897.

I feel quite sure that Greene's *L. magnus* is the same as *L. grandifolius.* This large leaved species, found in the coast region of California, especially in Marin county, is very distinct from the northern *L. polyphyllus.*

LUPINUS LIGULATUS Greene, Pittonia **1**: 215. 1888.
Southeastern Oregon.

LUPINUS LONGIPES Greene, Flora Franciscana 41. 1891.

No type is designated for this species, and in the cover in Dr. Greene's herbarium there are two things under this name. The broad leaved plant, from Summit if I remember rightly, is *L. procerus.* The seed is mentioned in the description, and the only specimen that shows both flowers and mature fruit, is the one collected by Mrs. Austin in Modoc county, California, but it was collected in August, 1894, and therefore can not be taken as the type. However, it seems to represent typical *longipes* according to the description. California and perhaps western Nevada in the Sierra Nevada.

LUPINUS PALLIDIPES Heller, Muhlenbergia **7**: 91. 1911.
Western Oregon.

LUPINUS POLYPHYLLUS Lindl. Bot. Reg. **13**: *pl. 1096.* 1827.
Western Washington and Oregon.

LUPINUS PRATENSIS Heller, Muhlenbergia **2**: 210. 1906.

This is a somewhat aberrant member of the group, having narrower leaves and smaller flowers than usual, but in habit it belongs to this section. Inyo county, eastern California.

LUPINUS PROCERUS Greene, Muhlenbergia **6**: 19. 1910.
Western Nevada.

LUPINUS RETRORSUS Henderson, Bull. Torr. Club **27**: 344. 1900.
Northern Idaho.

LUPINUS SUPERBUS Heller, Muhlenbergia **2**: 209. 1906.
Inyo county, eastern California.

LATIFOLII

Herbaceous perennials frequenting woodlands and borders of thickets. Stems rather tall, up to about 10 dm., more or less branched, not succulent, sparingly pubescent with short appressed hairs. Basal leaves smaller than those of the middle part of the stem, the petioles not elongated. Flowers violet, subsymmetrical at base. Plants of the Pacific slope.

This is part of the section Rivulares of Piper's Flora of Washington, also made to include the Polyphylli. But the name Rivulares can not stand, for none of the plants mentioned there are related to *L. rivularis.*

Lupinus confusus sp. nov.

Perennial (§Latifolii): stems several in clumps from a thick rootstock, about 9 dm. high, more or less purplish and pubescent with short appressed hairs, especially the lower part and the inflorescence, rather stout, about 6 mm. in diameter below, leafy: leaves rather remote; leaflets about 9, elliptical-oblanceolate, those of the middle part of the stem 5 or 6 cm. long, 1.5 cm. wide, the uppermost and lowermost somewhat smaller, bright green and glabrous above, paler and somewhat appressed pubescent beneath, midvein prominent on both surfaces, ending in a short cusp at the acutish apex; petioles equaling or somewhat exceeding the blade; stipules subulate, 1 cm. long, villous: peduncles short, 4 cm. long or less: inflorescence elongated, often 3 dm., rather dense: flowers violet, whorled, about equaling the internodes: bracts caducous, subulate, 15 mm. long, villous as well as pubescent with short appressed hairs: pedicels slender, 7 mm. long, sericeous with short drab hairs, as is also the calyx: upper calyx lip 7 mm. long, notched, broadly lanceolate and 4 mm. wide at base when spread out; lower lip 8 mm. long, entire, lanceolate, 2.5 mm. wide at base when spread out; a small bractlet 1 mm. long on the outside of the calyx *below* the sinus: corollas 15 mm. long, 11 mm. deep, 5 mm. between apices of banner and wings; banner with edges turned back and inrolled or meeting, the face very narrow, the apex produced dorsally into a keel-like point, the whole orbicular-ovate, 1 cm. wide when spread out; wings moderately inflated, the lower edges meeting, not exposing the keel, united only at the apex for a space of about 2.5 mm., rounded-oblique, 9 mm. deep at the middle; keel strongly curved, the lower half shortly ciliate, the apex purple: fruit not seen.

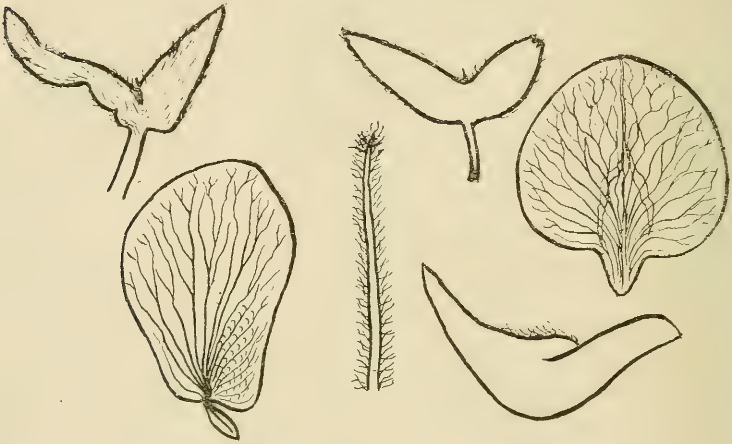


Figure 7. Floral parts of *Lupinus confusus*, enlarged.

The type, in the herbarium of the Nevada Agricultural Experiment Station, is *Heller 10107*, collected May 26, 1910 on Hood river, near Hood River, Wasco county, Oregon. The plants were growing in low moist ground about a mile and a half above the junction of Hood River with the Columbia.

This is probably the *L. rivularis* of Piper's Flora of Washington, as it is one of the species that has been masquerading under that name since 1873. It seems to be most closely related to *L. latifolius.*

The following species, in addition to *L. confusus*, belong to the Latifolii.

LUPINUS ADSURGENS Drew, Bull. Torr. Club **16**: 150. 1889.

According to Greene, Flora Franciscana 41, this is a synonym of *L. latifolius.* It was originally collected in northwestern California, in Humboldt county. The description is so vague that it might be any one of a dozen well known species. The flowers are said to be light yellow, an unusual color for this group.

LUPINUS CYTISOIDES Agardh, Syn. 18. 1835.

Collected in California by Douglas, perhaps in the neighborhood of Santa Barbara, which place was the southern limit of his journey in California. The species is not well known, but is evidently distinct from *latifolius.*

LUPINUS LATIFOLIUS Agardh, Syn. 18. 1835.

Also collected in California, and probably near Monterey. Recent specimens from the vicinity of Monterey seem to correspond fairly well with the original. One of them is my *6680*, collected near Del Monte in 1903.

LUPINUS VIRIDIFOLIUS Heller, Muhlenbergia **2**: 64. 1905.

Northern California on the upper Sacramento river.

This section is confined to the Pacific slope, the species usually occurring at rather low altitudes. *L. confusus* is the only one thus far recorded from the eastern side of the great mountain range which separates the Pacific coast region from the dry interior, but its presence there can be accounted for by the fact that a gateway is found for the distribution of such species along the Columbia river, a condition not found at any point south of this stream.

ARBOREI Agardh, Syn. 24. 1835.

This is Agardh's tribe H., which he describes as having "stems decumbent and persistent, the calyx ebracteolate, deeply bilabiate, keel ciliate." He also describes *L. arboreus* as having a sub-frutescent, decumbent stem, which is never the case, as it is always distinctly woody, and is certainly never normally decumbent. However, nearly all of the species are decumbent at the woody base. The flowers are among the largest in the genus, the herbage smooth appearing, and the lower calyx lip very broad. With the exception of the species described here, they are all plants of the immediate coast region. This new plant was found about fifty miles inland.

Lupinus lignipes sp. nov.

Perennial (§Arborei): woody stems prostrate, 1 cm. or less in diameter, herbaceous branches of the season erect, stout, hollow, 3 to 4 dm. long, numerous, the whole forming a compact clump 4 to 6 dm. across, the stems pale, somewhat pubescent with short, appressed, clear white hairs, sparingly leafy: leaflets commonly 7, elliptical-oblanceolate, 3.5 cm. long or less, 8 mm. wide or less, bright green and glabrous above, paler beneath with short appressed hairs, the lowermost ones the smallest, the apex rounded, the larger upper ones acute or acutish; petioles slender, pubescent like the stem, 3 to 5 cm. long; stipules subulate, 1 cm. long, the apex incurved: peduncles rarely over 8 cm. long, about the length of the inflorescence: flowers in about four whorls, large, violet and white: bracts subulate, 1 cm.

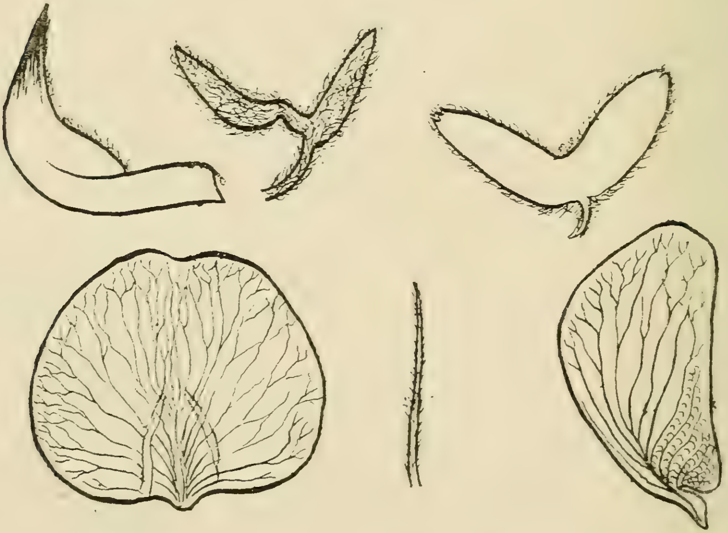


Figure 8. Floral parts of *Lupinus lignipes*, enlarged

long, pale, falling away early: pedicels slender, 1 cm. long, short villous, as is the calyx: upper calyx lip 8 mm. long, split at the apex for 2 mm., the sinus closed, the whole broadly lanceolate when spread out, 4 mm. wide at base; lower lip shortly 3-toothed, oblong when spread out, 4 mm. wide at base, nearly 2 mm. at apex: corollas 13 mm. long and as deep, distance between apices of banner and wings 7 mm.; banner with edges turned back and parallel, violet, lower part of the face yellow with purple dots, the middle and upper parts white, the whole orbicular when spread out; wings violet but paler on the sides, moderately inflated, completely inclosing the keel, united for 5 mm. at the apex, 9 mm. deep across the middle; keel sparingly short ciliate on the lower half, 4 mm. deep at the middle, strongly curved, the apex purple: fruit not seen.

The type, in the herbarium of the Nevada Agricultural Experiment Station, is *Heller 10042*, collected May 18, 1910, near Eugene, Lane county, Oregon, along the railroad in low, moist, grassy places.

It is a handsome species, the well rounded clumps covered with large violet and white flowers presenting a pleasing appearance. The casual observer would probably fail to note the true character of the plant, for the trailing woody stems are hidden in the grass. Its nearest relative is *L. variicolor*, from which it differs in much greater size, heavier woody branches, larger and more succulent herbaceous stems, narrower aud paler bracts, narrower and more silky calyx, and larger and paler flowers.

There is a specimen of it in my *variicolor* cover, *H. E. Brown 718*, collected near Mendocino, California, June, 1898. In 1898 I collected it at Montesano, western Washington, and distributed it as *L. littoralis*. The plant from "Crescent City," Del Norte county, California, collected by Howell, and mentioned by Greene when describing *L. propinquus* (Erythea **1**: 126), is also this species.

LUPINUS RIVULARIS Dougl.; Lindl. Bot Reg. **19**: *pl. 1595*. 1833.

" L. *rivularis;* perennis, subsericeus, viridis, caule herbaceo, foliolis 7 petioli longitudine subtus levissime pubescentibus, racemis verticillatis, bracteis pedicellis subaequalibus, calyce ebracteato: labiis integerrimis superiore basi gibboso, vexillo sessili alis sessilibus parallelo et aequali.

"L. rivularis. *Douglas in litt.*

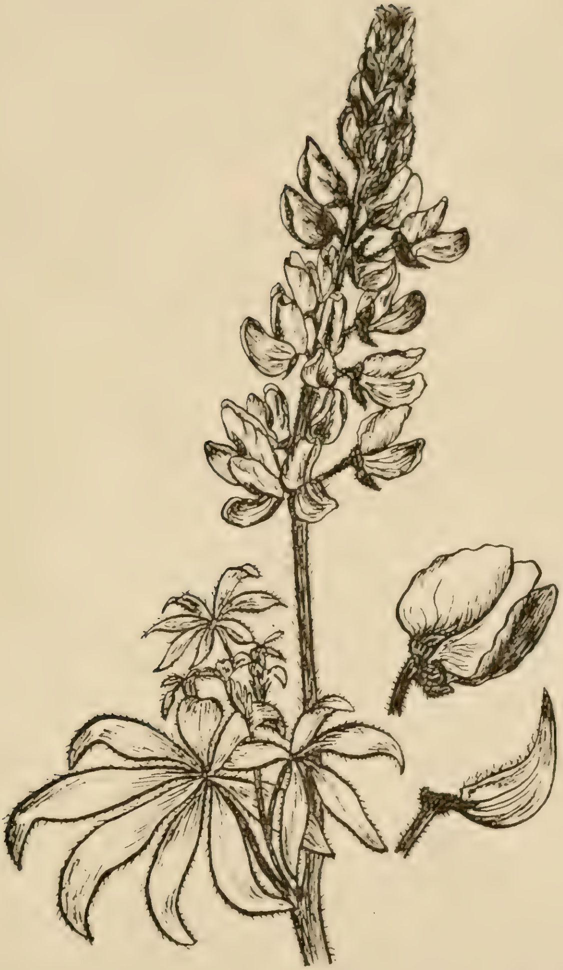
"Perennis. Caules erecti, bi-tripedales, pallide virides, levissime pubescentes. Poliola saepius 7, anguste obovato-oblonga, obtusiuscula, subcarnosa, apice recurva, subtus levissime pubescentia, petioli longitudine. Stipulae parvae, subfalcatae, erectae. Racemi verticillati, multiflori, fere glabri. Verticilli subsexflori. Bracteae lineares, acutae, pedicellis paulo longiores, citissime deciduae. Calyx ebracteolatus, bilabiatus, labio superiore ovato, basi gibboso, inferiore longiore, cymbiformi, indiviso, obtuso, subcarinato. Vexillum sessile, subrotundum, emarginatum, fere album, roseo paululum tinctum, basi coeruleo puro maculatum, alarum longitudine; alae sessiles, oblongae, obtusae, ventricosae, caeruleo-violaceae: carina alba, apice purpurea, rostrata, margine ciliata. Stamina omnino monadelpha.

"A native of California, whence seeds have been recently sent to the Horticultural Society. It forms a handsome hardy perennial, flowering in great profusion from May to September. In some respects this is even a better species for Gardens than *L. polyphyllus;* for, if less stately, it is more gay in its appearance, and a longer flowerer. The diversity of colours in the petals no doubt contributes very much to this effect, which is increased by its loose, but not straggling mode of growth.

"That this is very distinct from all the Lupines yet in our Gardens, no one who is acquainted with these plants would for a moment doubt. Yet it is most difficult to point out any positive characters by which it may be defined. It varies apparently in the degree of hairiness of its leaves and branches; and seems better distinguished by its pubescence being of the silky kind, by its short bracteae, and by its ebracteolate calyx, than by anything else that can be mentioned. J. L."

The above is a copy of the original description of *L. rivularis*. The next description was by Agardh in Synopsis Generis Lupini 24. 1835. He included it under his tribe Arborei, placing it before *L. arboreus*, and notes that he has seen a wild

Plate 6



Lupinus rivularis Dougl. Copied from the Botanical Register.

specimen in the herbarium of Lindley. He changes the character of the stem from "erect" to "subfrutescent, decumbent," and in this is followed by Torrey and Gray, Fl. N. A. **1:** 376. 1840. They indicate that they had seen a specimen collected by Douglas, but at the present time there seems to be no specimen extant in this country, with the exception of a fragment in the Gray Herbarium, consisting of a couple of leaves, several flowers and pods.

In 1873, Watson, in Proc. Am. Acad. **8:** 525, says: "The species has been known only from the figure (*Bot. Reg.* 19, *t.* 1595) and a cultivated specimen in Herb. Lindley. These seem to accord sufficiently well with the ordinary *L. cytisoides* Agh., and the older name is retained."

Watson's disposition of the species has been accepted by botanists without question up to the present time, with the exception of Greene, who in Flora Franciscana 46, treats *rivularis* as a synonym of *arboreus.* It seems strange that Watson should have ignored the judgment of botanists who had seen the original, and transferred the name to an entirely different group, the Latifolii, not seeing the differences that are to be found in the descriptions of *rivularis* and *cytisoides.*

About two years ago, Miss Eastwood, then at the Gray Herbarium, wrote me that *L. propinquus* Greene, is probably the same as *rivularis*, and that my *6804* from Carmel bay, California, may be the same, a conclusion I had also arrived at independently. Early this year she wrote from London, with one of my specimens before her, that "6804 is probably *L. rivularis.*"

Last summer while at the Gray Herbarium, I noted the following concerning the plant here described as *L. lignipes:* "May be *L. rivularis.* There are a couple of leaves in the Gray Herbarium which agree almost perfectly, but the flower is smaller. Smooth pods." This fragment and the older descriptions have somewhat shaken my belief that the upright shrubby plant from Carmel bay is true *rivularis.* There is considerable evidence to show that *rivularis* and *variicolor* may be identical. *L. variicolor* has a smaller flower than either *arboreus* or the Carmel bay plant, and Lindley's reference to "the diversity of colours in the petals," and "its loose, but not straggly, mode of growth," rather strengthens the supposition. The pods of *variicolor* are more nearly smooth than are those of the other species.

Whatever may be the true status of *rivularis*, it certainly belongs to the Arborei and not to the Latifolii where Watson placed it.

Besides *L. lignipes* and *L. rivularis* the following names belong to the Arborei:

LUPINUS ARBOREUS Sims, Bot. Mag. *pl. 682*. 1803.

The native country of this species was unknown when it was published, and for some time the type was thought to have come from South America. It was no doubt collected at Monterey, California, where it is plentiful in sand near the coast.

LUPINUS EXIMIUS Davy, Erythea **3**: 116. 1895.

Although the type of this is in the herbarium of the University of California, Jepson does not mention it in his Flora of Western Middle California, either as a valid species or as a synonym. It is certainly distinct and is a handsome large violet flowered species, originally collected "above Lake Pilarcitos, San Mateo Co., Calif." It is apparently also found on Mt. Tamalpais north of San Francisco. The only montane species in the group.

LUPINUS PROPINQUUS Greene, Erythea **1**: 126. 1893.

Originally collected at Santa Barbara, California, and said to occur as far north as Point Reyes.

✓ LUPINUS VARIICOLOR Steud. Nomen. **2**: 78. 1841.

Lupinus versicolor Lindl. Bot. Reg. *pl. 1970;* not Sweet, Brit. Fl. Gard. **2**: *pl. 12*.

Lupinus franciscanus Greene, Pittonia **1**: 64. 1887.

Originally collected by Douglas, undoubtedly about Monterey, where it is plentiful. Jepson, in the second edition of his Flora says "too near the next" (*L. Chamissonis*), which does not at all resemble it, being related rather to *L. albifrons*, which as I see it, does not belong to the Arborei.

ALPINE PLANTS—X

BY P. BEVERIDGE KENNEDY

ALPINE RABBIT BRUSH

CHRYSOTHAMNUS MONOCEPHALUS Nelson and Kennedy, Proc. Biol. Soc. Wash. **19:** 39. 1906.

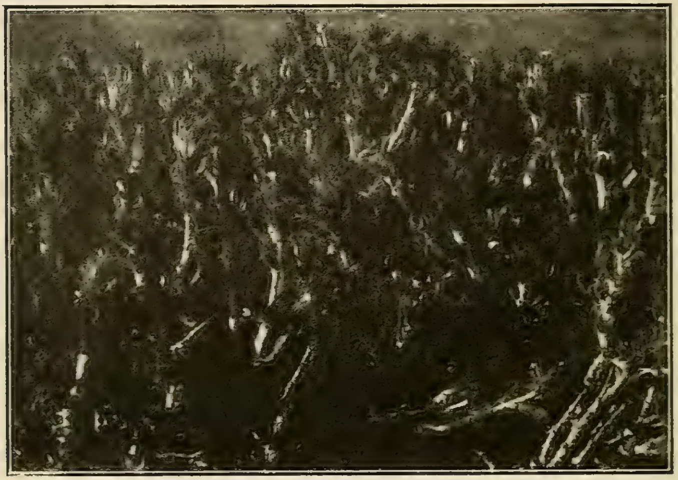


Figure 9. *Chrysothamnus monocephalus* Nelson and Kennedy

The genus *Chrysothamnus* and allied genera need revision perhaps more than any other large group of western plants. Unfortunately, they are of little or no forage value, although covering large areas in the Great Basin region.

This alpine species of *Chrysothamnus* which we here illustrate was described as new in 1906. It is a rigid shrub about a foot high, with numerous short divaricate branches, sharp pointed leaves and insignificant pale yellow flowers. It grows among lava rocks on Mt. Rose, Washoe county, Nevada, at from 10000 to 10800 feet elevation.

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A new edition of the Catalog of North American Plants is in preparation. Thus far 140 pages have been printed, and other parts will follow as fast as possible. In all there will be about 300 pages. Since a considerable time must elapse before the work can be completed, the 140 pages and other parts as soon as issued, will be sent to those who wish to have them in that form, for $1.25, payment to be sent with the order.

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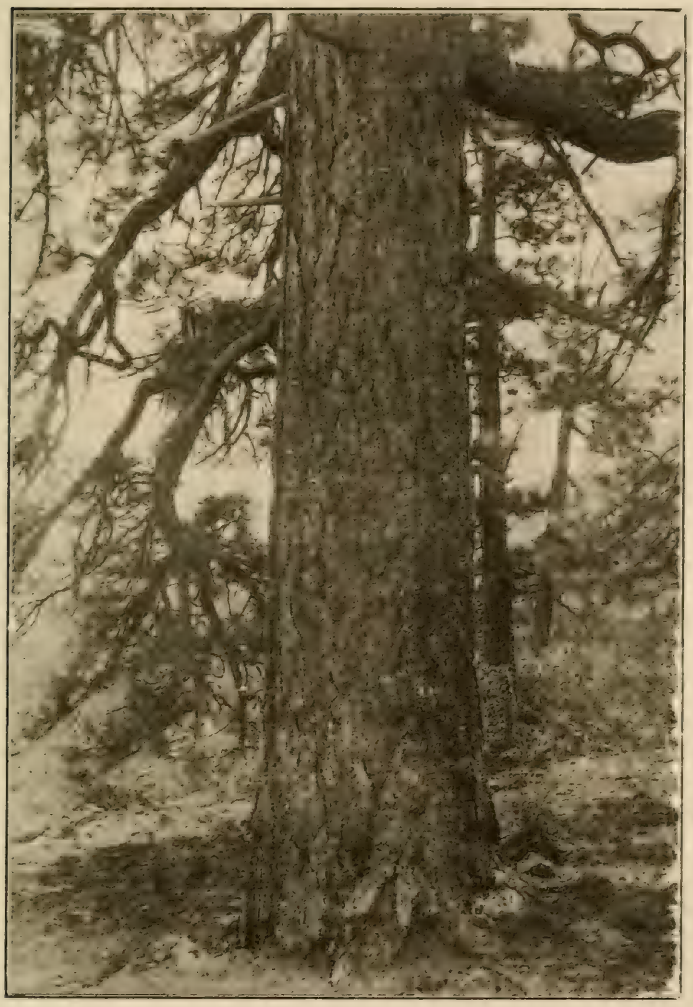

Pinus Jeffreyi. A mature tree on the mountains north of Verdi, Nevada.

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Volume 8 August 10, 1912

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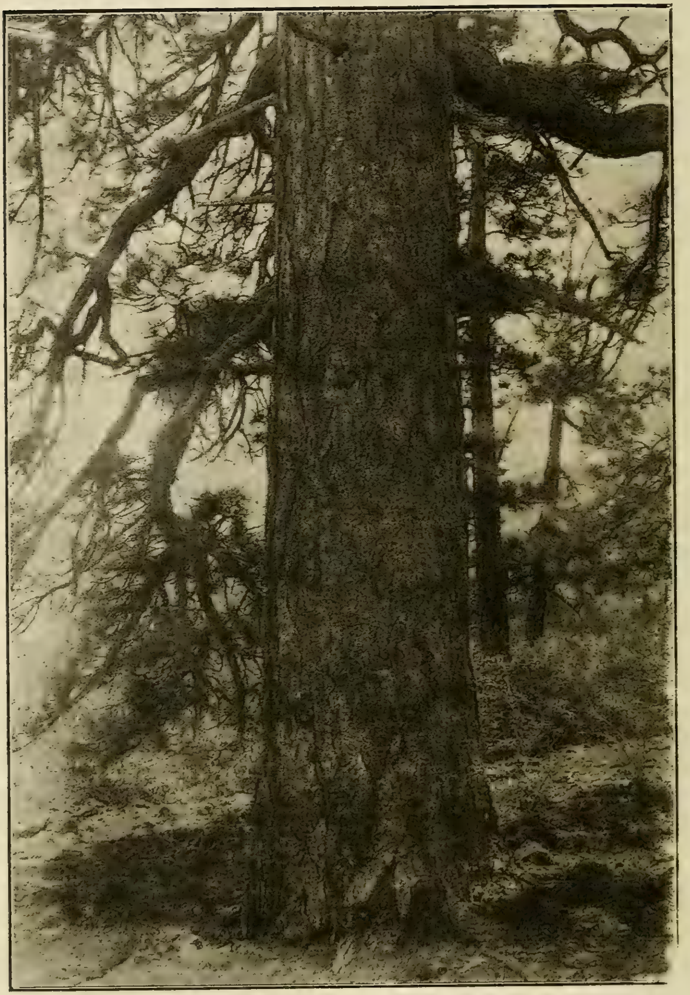
PINUS PONDEROSA AND PINUS JEFFREYI

By A. A. Heller

About two years ago a student of the University of Nevada who proposed to take up the study of forestry, came to me for instruction in dendrology. Up to that time I had given no special thought to our trees, but now this fascinating branch of botany is one of my special studies, and a regular course in dendrology is being given in the College of Agriculture.

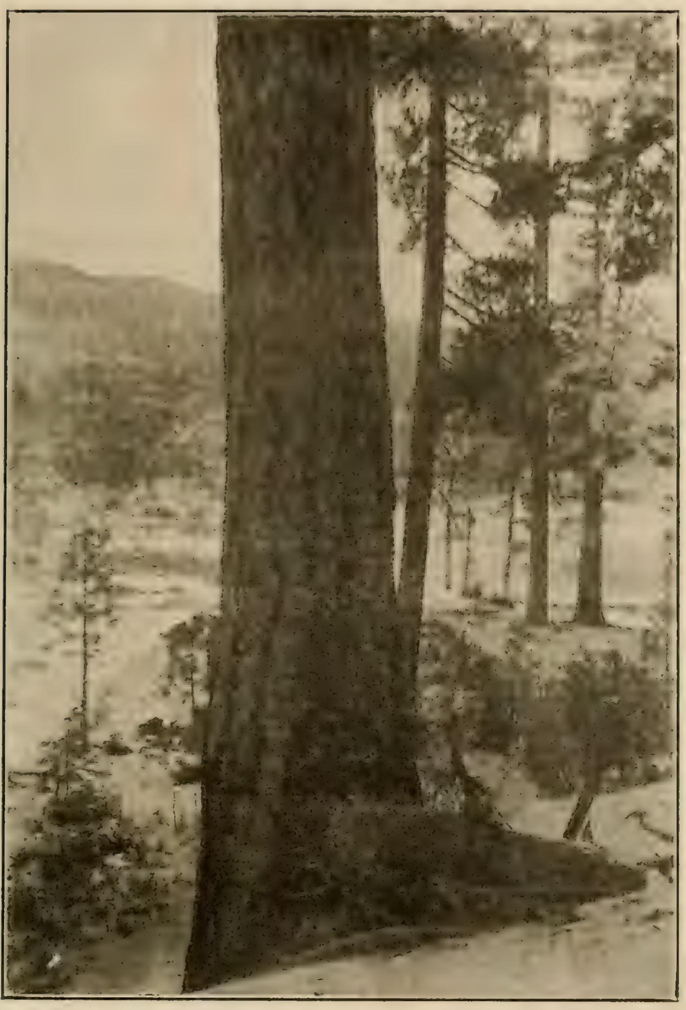
The Sierra Nevada mountains, lying some ten miles west of Reno, are timbered, especially on the lower slopes, with what is commonly known as western yellow pine. A few scattered trees even find their way along the dry hills north of us. During the course of my work came the problem of naming this pine. Sargent's Manual, Britton's North American Trees, and Jepson's Silva of California credit this region with *Pinus ponderosa* and what they call the variety *Jeffreyi*, but none of these works give any definite or precise information concerning the distinguishing characters of the two forms. One gets a vague impression that *Jeffreyi* may be recognized by its larger cones. Finally, this spring after consulting Sudworth's Forest Trees of the Pacific Slope, issued by the Forest Service at Washington, I got some real information. Sudworth treats *Jeffreyi* as a species and describes it intelligibly, a thing that is rarely done when a varietal name is used. His book is the best thus far issued, not only in point of information but of illustrations as well. After studying his descriptions of *ponderosa* and *Jeffreyi* I was soon able to readily distinguish the two, and a little comparison showed that quite young trees are as clearly differentiated as mature ones. The blue-green leaves and smooth gray

Plate 7



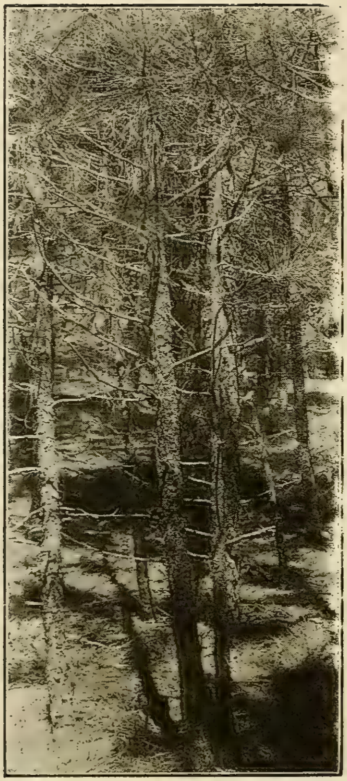
Pinus Jeffreyi. A mature tree on the mountains north of Verdi, Nevada.

Plate 8



Pinus ponderosa. Mature tree above Dog valley, California.

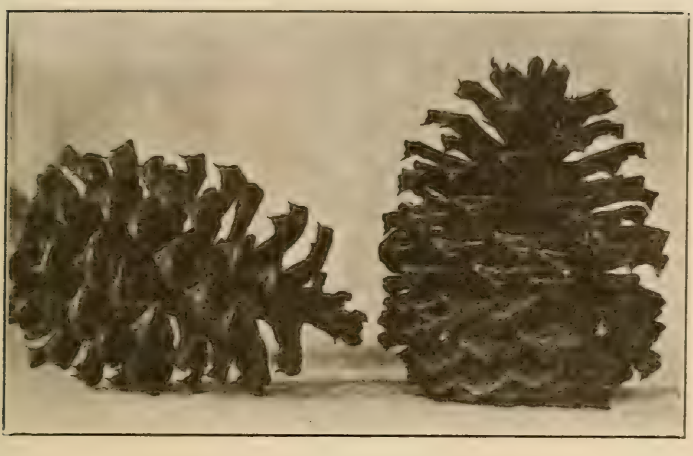
Plate 8



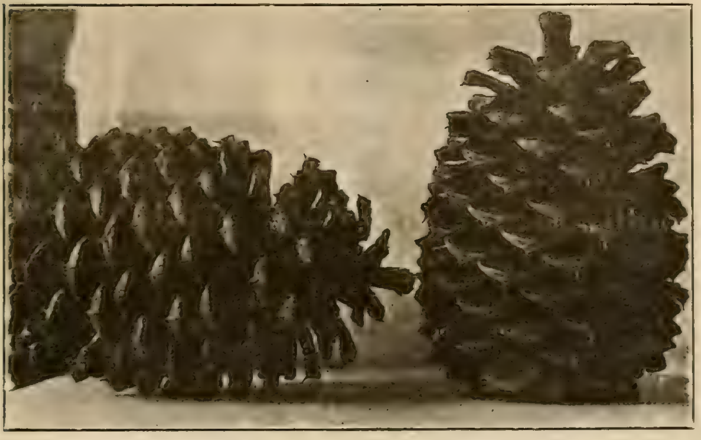
Pinus ponderosa, near Verdi, Nevada

Pinus Jeffreyi, Verdi, Nevada

Plate 10



Pinus ponderosa, Floriston, California



Pinus Jeffreyi, Verdi, Nevada

bark of young *Jeffreyi* are in striking contrast to the bright or apple-green leaves and rough brown bark of *ponderosa* of equal age.

Pinus ponderosa was discovered May 12, 1826, in the vicinity of Spokane, Washington, by David Douglas. It is widely distributed, according to Sudworth, "occurring in every State west of the Great Plains and one hundredth meridian," and is also found in northern Mexico proper as well as Lower California. If *P. scopulorum* of the Rocky mountains, which he includes in this range is excluded, the statement must be modified.

Pinus Jeffreyi was first collected October 24, 1852, in Shasta valley, or more probably on the edge of Shasta valley, in northern California, by John Jeffrey. The northern limit of the species is Douglas county, Oregon, according to Jepson, Silva 81, and is found as far south as Mt. San Pedro Martir, Lower California. It is also the chief timber tree of western Nevada as it is found in greatest abundance on the eastern slope of the Sierra Nevada.

Since this paper is but preliminary to an exhaustive study of the two species as they occur in Nevada, I shall merely point out the chief differences, and with the accompanying illustrations it should not be difficult to distinguish them. Some persons claim that *Jeffreyi* merges into *ponderosa*, but I think this is not the case. While *Jeffreyi* is the predominant tree in western Nevada, *ponderosa* is more or less mixed with it. The bark of mature trunks is, of course, somewhat variable, but there is enough sameness in the members of the one species to distinguish them from the other. Even the smallest cones of *Jeffreyi*, but little larger than the maximum ones of *ponderosa*, are easily separated by the broader, rather thinner scale with a slender, usually downcurved prickle. The seeds are nearly twice larger, much more mottled, and are of a different shape. The two species are much alike in habit and have leaves of about equal size, and this is about all that they do have in common.

P. PONDEROSA	P. JEFFREYI
Seed leaves 5 to 9.	Seed leaves 7 to 10.
Bark of young trees scaly, light brown.	Bark of young trees nearly smooth, gray.
Bark of old trees russet-red, divided into broad, rather regular plates.	Bark of old trees dark red-brown, deeply furrowed and the ridges usually narrow.
Young shoots with a strong odor of orange when broken.	Young shoots with a violet-like odor when broken.
Leaves bright yellow-green, persisting about three years.	Leaves blue-green, persisting five to eight years.
Wood fine grained, with thick heartwood.	Wood coarse grained, with little heartwood.
Cones 3 to 6 inches long, 2½ to 3½ inches thick.	Cones 6 to 11 inches long, 4 to 5 inches thick.
Cone scales usually widely spreading, the largest about 2 cm. wide, thickened at apex, prickle stout with a broad heavy base.	Cone scales not usually wide spread, the largest 2.5cm. wide, moderately thickened at apex, prickle slender, downcurved from a low, broad base.
Seeds 8mm. long, 5mm. wide, slightly mottled; wing about 23 mm. long, widest at the middle.	Seeds 14 mm. long, 7 mm. wide, prominently mottled; wing about 20 mm. long, widest above the middle.

ADDITIONS TO THE FLORA OF SOUTHERN CALIFORNIA

By S. B. PARISH

The plants in the following list consist of two classes. First, plants from the north now reported from stations which are their present known southern limit. As they are, with two exceptions, natives of the high Sierra Nevada, there is little geographical opportunity for their further extension southward. Second, plants of recent introduction into southern California, and all of them, I think not heretofore recorded from the state. The most are as yet hardly more than casuals, and may never succeed in obtaining a permanent place in our flora. Some, however, are weeds of wide distribution, and may have a future before them. In this event a record of first appearances will be of historical interest.

PANICUM MILIACEUM L. Sp. Pl. 58.

In cultivated fields, Riverside, October, 1910, *F. M. Reed 3112.*

POA NERVOSA (Hook.) Vasey, Ill. N. Am. Grasses **2:** 81.

West canyon, Palm Springs, Colorado desert, April 18, 1907, *Parish 6141.* This and the following species were identified by Professor A. S. Hitchcock.

POA HOWELLII V. & S. var. MICROSPERMA Vasey, Cont. U. S. Nat. Herb. **1:** 273.

Waterman canyon, San Bernardino mountains, at 3000 feet altitude, May 29, 1906, *Parish 6206.* The type was collected at Santa Cruz.

ECHINODORUS CORDIFOLIUS (L.) Griseb. Abh. K. Ges. Wiss. Goett. **7:** 257. *E. rostratus* Engelm.

According to Small (N. Am. Flora **17:** 47) this plant does not extend west of Texas, but specimens collected by Davidson at Garvanza, and my no. *2246* from mud flats at Elsinore, are unmistakably of this species. Small credits *E. radicans* Engelm. to southern California, but I have seen no material from our region that could possibly be referred to that very distinct species.

ASPHODELUS FISTULOSUS L. Sp. Pl. 309.

Bryn Mawr, San Bernardino valley, 1909, *Professor George Robertson.* This old world plant is abundantly naturalized in northern Mexico, but has not been reported heretofore from the United States. It probably owes its presence at Bryn Mawr to the Mexican settlement at that place. Identified by Professor Fernald.

LIMNORCHIS LAXIFLORUS Rydb. Bull. Torr. Club **28**: 630. *f. 23.*

Whitewater Basin, August, 1909, *Mrs. C. M. Wilder.* Type collected in Oregon. Identified by Dr. Rydberg.

CYCLOLOMA ATRIPLICIFOLIUM Coulter, Mem. Torr. Club **5**: 143.

Near Rialto, June, 1909, *Mrs. C. M. Wilder.* A plant of the plains region.

SANICULA ARCTOPOIDES H. & A. Bot. Beechey 141.

El Monte, Los Angeles county, May 17, 1906, *George B. Grant 2616.* Not known heretofore south of Monterey.

AGROSTEMMA GITHAGO L. Sp. Pl. 435.

In a lemon grove near San Bernardino, March, 1912, *Miss H. E. Brayton;* in an orchard, June 15, 1912, *Parish 8053.*

PYROLA PALLIDA Greene, Pittonia **4**: 39.

Whitewater Basin, San Bernardino mountains, August, 1909, *Mrs. C. M. Wilder.* This species was founded on plants collected on Mt. Shasta, and the present collection brings it to the southern end of the state. I have seen specimens from the Yosemite, and the plant no doubt occurs at intermediate points.

LYCIUM BARBINODUM Miers, Ill. S. Am. Pl. **2**: 115. *pl. 68.*

Occasional in waste places about San Bernardino. Brookside Park, June, 1911, *Parish 8046.*

SOLANUM ROSTRATUM Dunal, Sol. 234. *pl. 24.*

Mentone, San Bernardino valley, 1911, *Professor George Robertson.*

PLANTAGO ELONGATA Pursh, Fl. Am. Sept. 729.

Collected several years ago, at San Diego, by *Brandegee.* This species is native in Oregon, but has not been known heretofore from California. Whether native or introduced at San Diego is doubtful.

GALIUM BIFOLIUM Wats. Geol. Expl. 40th Par. **5**: 134. *pl. 14.*

Bear valley, San Bernardino mountains, 6500 feet altitude, July, 1909, *Dr. A. Davidson 2291.*

LACTUCA SCARIOLA L. Sp. Pl. ed 2, 1119.

The form of prickly lettuce heretofore reported from California has been the variety *integrata* Gren. & Godr., distinguished by its spinulose-toothed leaves. The species, which has runcinate or pinnately lobed leaves, is now abundantly established about Urbita, a suburb of San Bernardino.

HELIANTHUS PETIOLARIS Nutt. Journ. Phila. Acad. **2**: 115.

In Hall's Compositae of Southern California this species is credited to our region on my authority, founded on a single collection made at Fredalba Park. The specimen is no longer in existence, and its authenticity is uncertain. But in recent years the plant has become very common in alfalfa fields, in some parts of San Bernardino valley, where it has perhaps been introduced in the seed of barley, which is planted as a shade crop in starting alfalfa. It is probably never native in our region.

San Bernardino, California.

THE NORTH AMERICAN LUPINES—VII.

By A. A. HELLER

Lupinus borealis sp. nov.

Perennial: stems simple, 3 dm. high, somewhat villous hirsute, rather slender, about 3 mm. in diameter, not fistulous, leafy throughout: leaves large and long petioled for the plant; petioles, except the few uppermost, 10 to 14 cm. long, rather stout, the lowermost with enlarged base 4 or 5 mm. wide; stipules linear subulate, 1 cm. long, villous; leaflets 7 to 9, elliptical-oblong, acute, mucronate, 6 or 7 cm. long, 1.5 cm. wide, dull yellow green and glabrous above, paler and sparingly appressed villous below, the yellowish midvein prominent beneath: peduncle short, about 3 cm., a little exceeded by the inflorescence: flowers violet, somewhat whorled, 13 mm. long and as deep, subsymmetrical at base, distance between apices of banner and wings 5 mm.: bracts lance-acuminate, 1 cm. long, 2 mm. wide at base, densely villous, as are pedicels and calyx: pedicels rather slender, 5 mm. long: upper calyx lip 5 mm. long, 2 lobed, the sinus nearly 2 mm. deep, the apices 1 mm. apart, the whole broadly ovate, 5 mm. wide at base when spread out; lower lip 7 mm. long, 3-toothed, 2 mm. wide at apex, 4 mm. at base when spread out; subulate bractlet *at the base* of the calyx, extending to the sinus: banner with edges turned back and parallel or somewhat inrolled, face rather broad, white or yellowish, fading purple, the protruberances at the joint prominent and keel-like; wings rather broadly inflated, the lower edges closed, not exposing the keel, upper edges probably closed, with a depression on either side, the whole 8 mm. deep at the middle; keel strongly curved, 5 mm. deep at the middle, glabrous, the apex purplish: fruit not seen.

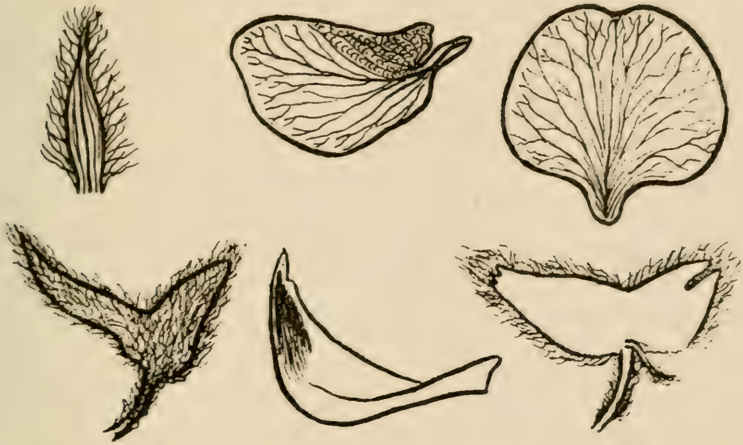


Figure 11. Enlarged floral parts of *Lupinus borealis*.

The type, in the herbarium of the Nevada Agricultural Experiment Station, is *John Macoun 58426*, collected July 9, 1902, at Rink Rapids, Klondike river, Yukon Territory.

This handsome, large flowered species should probably be grouped with *L. Wyethii*, although at present I do not know its exact relationship. Another plant which I also refer to *L. borealis* is *John Macoun 58427*, collected on Hunker creek, Yukon Territory, July 24, 1902. It has narrower leaves, and being a more mature plant, has a larger inflorescence. Older plants would probably show an inflorescence two or three times as long as the type, which has unopened flowers at the apex of the spike.

LUPINUS WYETHII Wats. Proc. Am. Acad. **8:** 525. 1873.

Last summer I looked for the type of this species in the Gray Herbarium, where presumably it should be found, but did not notice it there. Wyeth collected it on the "Flathead River, Oregon." The type may be in the herbarium of the Philadelphia Academy, as many of Wyeth's specimens are there. The Flathead river of Wyeth is Clark's Fork of the Columbia, and the plant was probably collected in what is now the state of Montana. The other specimen mentioned by Watson, collected by Spalding on the Clearwater I have seen, and have also found the same thing along that stream, but doubt whether it is identical with Wyeth's plant. It may be that Watson used Spalding's plant when writing the description, but that can be decided only after a careful examination of the two.

Lupinus columbianus nom. nov.

Lupinus confusus Heller, Muhlenbergia **8:** 63. 1912; not *L. confusus* Rose, Cont. U. S. Nat. Herb. **8:** 307. 1905.

It seems that I have no good excuse to offer in the case of this homonym, for Rose's name is plainly listed in the third supplement to the Index Kewensis. *L. confusus* Rose, is a Mexican species.

LUPINUS PALLIDUS Brandegee, Zoe **4:** 203. 1893.

The type of this was collected in "sands in the dry bed of the creek near the Mission of San Vincente in northern Baja California, May, 1893," by Brandegee. It is an annual, perhaps referable to the Micranthi, and has been collected at a number of places in San Diego county, California. *L. desertorum* Heller, may be a synonym, but as yet I have had no opportunity to dissect and compare the flowers.

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Entered as second-class matter November 24, 1908, at the post office at
Reno, Nevada, under the Act of Congress of
March 3, 1879.

ANNOUNCEMENT

A new edition of the Catalog of North American Plants is in preparation· Thus far 140 pages have been printed, and other parts will follow as fast as possible. In all there will be about 300 pages. Since a considerable time must elapse before the work can be completed, the 140 pages and other parts as soon as issued, will be sent to those who wish to have them in that form, for $1.25, payment to be sent with the order.

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A. A. Heller,

539 West 5th street, Reno, Nevada

Volume 8 Number 8

MUHLENBERGIA

AUGUST, 1912

Editors: A. A. HELLER and P. BEVERIDGE KENNEDY

Rhodiola integrifolia Raf.

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University of Nevada,
Reno, Nevada

Volume 8 September 30, 1912

MUHLENBERGIA

THE NEVADA LUPINES—VII

By A. A. Heller

Lupinus rubens Rydb. Bull. Torr. Club **34**: 45. 1907

Caulescent, branched from the base, about 1 dm. high, the branches tinged with red and more or less hirsute throughout except the glabrous upper surface of the leaflets: petioles 2 to 4 cm. long; stipules green or greenish, narrowly lanceolate, less than 3 mm. long, nearly basal; leaflets commonly 7, spatulate or oblanceolate, 15 mm. long, 5 mm. wide, the pubescence of the under side appressed: peduncles very short, about 1 cm.: inflorescence lax, about 1 dm. long, overtopping the leaves: bracts membranous, subulate, less than 3 mm. long, bearded wtih scattered stiff white hairs: pedicels slender, 4 mm. long: corollas violet-purple, 9 mm long, 7 mm. deep, space between apices of banner and wings 2 mm.: calyx more or less hirsute-ciliate, the upper lip 2 mm. long, sharply 2-toothed, broadly ovate, 2 mm. wide at base; lower lip 5 mm. long, 3 mm. wide at base, lanceolate, acute, entire: banner with a quadrate yellow spot on the

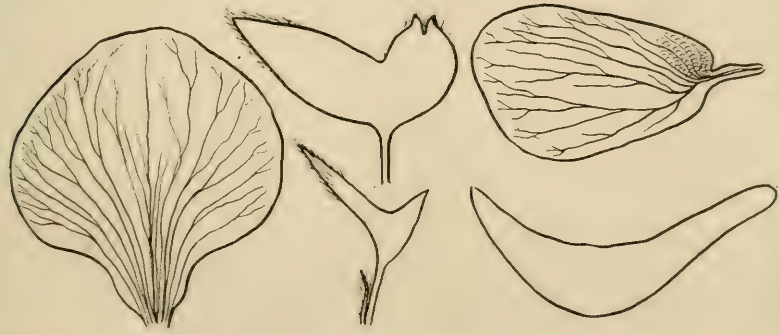
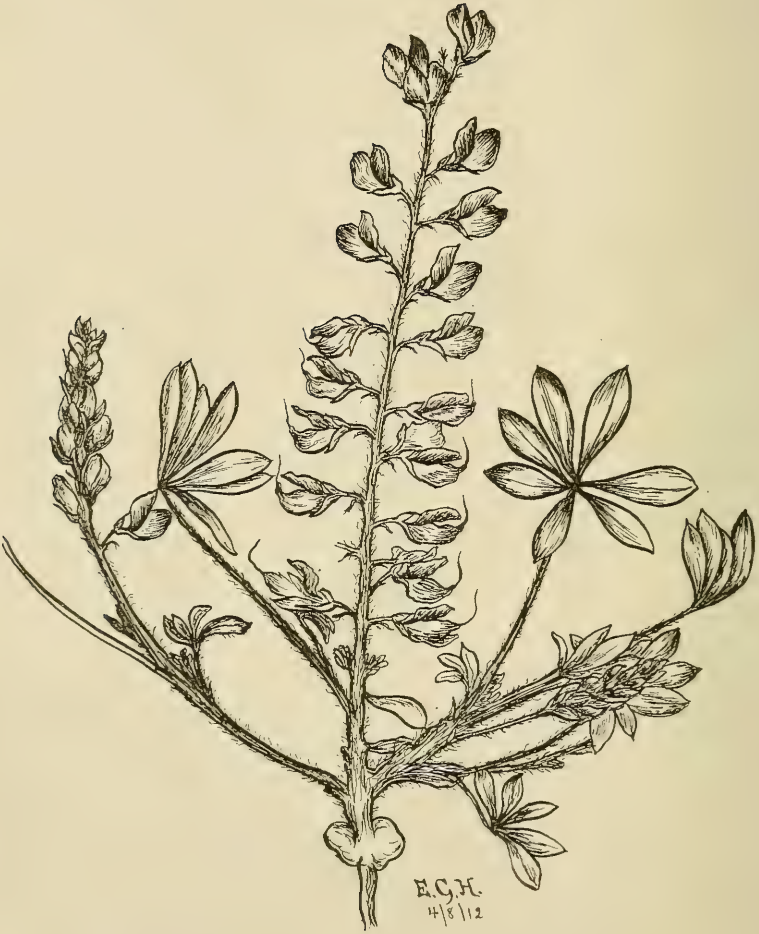


Figure 12. Floral parts of *Lupinus rubens*, enlarged

Plate 11



Lupinus rubens Rydb.

face, broadly obovate, 7 mm. wide when spread out, the sides turned back and probably parallel; wings apparently entirely covering the keel, 5 mm. deep; keel strongly curved.

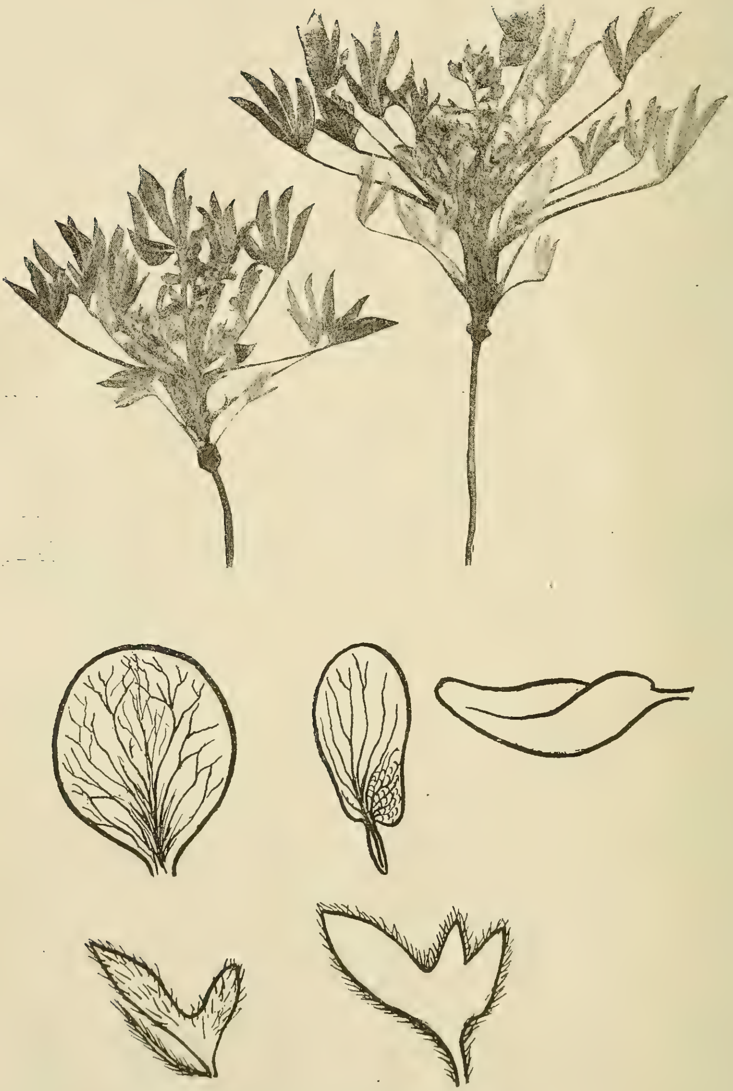
The description and illustrations are from *Parry 41*, collected near St. George, Utah, in 1874, the specimen in the herbarium of the Missouri Botanical Garden. This is part of the type collection. Dr. Rydberg compares this with *L. pusillus*, but the habit and aspect is different. A remarkable feature of this species is that the stipules are more nearly free than in any related species.

L. rubens has been collected at least once in Nevada. *Goodding 2234a* from Dry Lake, Clark county, distributed as *L. pusillus*, is this species. It is grouped with the subgenus *Platycarpos*. Since none of the Great Basin and interior species are strictly typical, I now propose a new section for them, which may bear the name PUSILLI, from the oldest species in the section. They have medium sized connate cotyledons with entire edges, scattered, usually violet flowers which are shaped much like those of typical Lupinus, the calyx lobes both green, the upper one usually well developed; pods ovate or elongated, and sometimes more than 2-seeded.

Lupinus intermontanus sp. nov.

About 1 dm. high, with an equal spread, or sometimes one and a half times the height, caulescent, the stem proper about 2 cm. long, the branches at first ascending, finally spreading, whole plant except the upper surface of the leaflets hirsute with spreading white hairs: petioles two or three times the length of the blade, with a prominent yellow midrib; leaflets usually 5, oblanceolate-oblong, rounded at the apex, 2 cm. or less in length, up to 7 mm. wide, appressed hirsute beneath, glabrous above, margins ciliate: peduncles very short, rarely as much as 1 cm. long, the inflorescence up to 4 or 5 cm., but the whole shorter than the leaves: flowers bright violet-blue fading white or pinkish, 6 mm. long, 5 mm. deep, distance between apices of banner and wings about 2 mm.: bracts membranous, oblong-lanceolate, 5 mm. long, over 1 mm. wide at base, bearded with long hirsute

Plate 12



Lupinus intermontanus Heller

hairs: pedicel barely 2 mm. long, glabrous: calyx tube nearly glabrous; lobes green, hirsute like the rest of the plant, the upper about 1.5mm. long, cleft to the base into lanceolate divisions; lower 3 mm. long, entire: banner with the edges turned back, appearing as if shorter than the wings, when spread out 6 mm. long, 5 mm. wide; wings moderately inflated, open and exposing the keel to a point a little above the lower calyx lobe: keel moderately curved: fruit not seen.

The type, in the herbarium of the Nevada Agricultural Experiment Station, is *Heller 9599*, collected at Wadsworth, Churchhill county, Nevada, May 7, 1909, growing in granite sand in open places in the sage brush.

This species has been distributed by me as *L. pusillus*, to which it is nearest related. Other collections from Nevada are *Shockley 270* from Candelaria, and *Watson 221* in part, from near Unionville. *Purpus 5802* from "sandy plains, Deep Spring Valley, Calif." also belongs here. It is apparently confined to western Nevada and southeastern California, although it may be found in southeastern Oregon.

Lupinus variegatus sp. nov.

Perennial (§ Calcarati): stems clustered from a thick woody rootstock, 4 or 5 dm. high, shortly appressed silky but not pale, unbranched, leafy: leaflets 9 to 11, oblong-oblanceolate or oblanceolate, 4 cm. long, 6mm. wide, acute and apiculate, or about 8 mm. wide and obtuse, light green and sparingly appressed pubescent above, paler and more densely pubescent beneath, or the broader obtuse forms silvery beneath, the pale midvein rather prominent; petioles of lower leaves up to 12 cm. long, those of the uppermost 2 cm. or less; stipules subulate, 6 or 7 mm. long, nearly free: peduncles short, 2 or 3cm. long: inflorescence rather dense, 1 dm. or less, the pedicels, calyx and bracts densely short hirsute: flowers yellow and purple, occasionally white and purple, or entirely yellow, spurred at base, the spur thick, barely 2 mm. long: bracts lanceolate, 6 mm. long, 1 mm. wide at base: pedicels rather stout, 5mm. long: upper calyx lip pale, 2-toothed the whole broadly ovate, 3 mm. long, 5 mm. wide at base; lower lip broadly lanceolate, 4 mm. long, 3 mm. wide at base, entire or sometimes imperfectly 3-toothed; a bractlet 1 mm. long in the sinus between the lips: corollas 11 mm. long, 9 or 10 mm. deep, a space of 3 mm. between apices of banner and wings; banner a little longer than the wings, its edges turned back and parallel, about 6 mm. apart, back glabrous, face 3 mm. across, slightly flaring at the apex, the groove narrow; wings with a low inflation, 4 mm. wide and 4 mm. deep but 6 mm. deep when fully spread out, the upper edges raised into a sharp ridge, on either side of this a broad depression, lower edges closed, completely hiding the keel; keel glabrous, but little curved: pods 3.5 cm. long, 7 mm. wide, 5 or 6-seeded, somewhat villous with tangled white hairs: seeds light brown-red, smooth and shining, somewhat lenticular in appearance, 5 mm. long, 4 mm. wide at the rounded top, the base narrower.

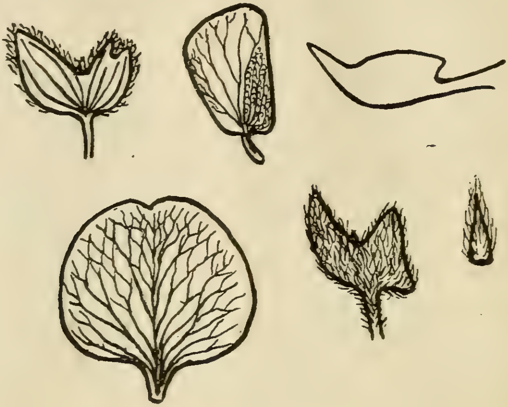


Figure 13. Floral parts of *Lupinus variegatus*, enlarged

The type, in the herbarium of the Nevada Agricultural Experiment Station, is *Heller 10551*, collected July 8, 1912, on the Ruby mountains near Deeth, Elko county, Nevada, at an elevation of 7300 feet. The pods and seeds were obtained about a thousand feet lower, from plants which seemed to be identical but were past flowering.

The nearest relative of this species is *L. calcaratus* of western Nevada. The flowers seem to average larger than those of *calcaratus*, which are wholly white or purple tinged, are not so broadly inflated, the banner is glabrous, more rounded in outline, the wings deeper, the keel less curved, and the calyx of different shape. The pubescence is practically the same. The flowers are sweet scented.

This species has an altitudinal range of about 1800 feet. The type was collected well toward the upper limit, which is at about 7500 feet. It inhabits open slopes, growing among the sage brush, and even where thickets of aspen and Amelanchier occur, is never found in them.

From about 7500 to 7900 feet was found a purple and white flowered form which does not seem to differ essentially in floral characters. The flowers were less fragrant, the keel slightly more exposed, and the whole plant more pubescent.

LUPINUS STENOPHYLLUS (Nutt.) Rydb. Bull. Torr. Club **34:** 42. 1907.

Lupinus foliosus var. *stenophyllus* Nutt.. T. & G. Fl. N. A. **1:** 377. 1840.

The type of this was collected on the "Oregon plains" by Nuttall, and is represented in several eastern herbaria by a piece of the top of a plant showing a rather lax one-sided flowering spike. The semi-spurred flowers have the face of the banner almost concealed by the wings, and have a rounded appearance. The leaves are few and narrow, scythe-shaped.

In the meadows about Deeth, Elko county, is found a lupine which Dr. Rydberg says matches closely the original plant. It agrees fairly well with several other specimens in the *stenophyllus* cover, but I am not certain that these are rightly placed. While the flower is of the same type, my specimens are corymbosely branched, with a rather dense inflorescence of somewhat whorled flowers. The leaves are more numerous, and while narrow and acute, do not have the same appearance. I am inclined to think that true *stenophyllus* will prove to be a northern plant of limited range, but without flowers from the type for dissection, shall refer my plant to it for the present. It is being distributed under number *10554*.

NEW SOUTHWESTERN FERNS

BY LESLIE N. GOODDING

Southern Arizona is especially rich in ferns. Its arid and isolated ranges produce them in great variety and beauty. After collecting ferns from this section for several seasons and studying them with inadequate library and herbarium facilities, I decided to send my collections to Dr. Nelson, of the University of Wyoming, along with some notes and descriptions I had made. As a result I submit this paper.

ASPLENIUM PARVULUM **grandidentatum** var. nov.

Rootstock short, sparingly clothed with black scales: stipes tufted, very short, 1 to 3 cm., cherry-black, shining, rather fragile; rachis similar: frond linear, 10 to 15 cm. long, 1 to 1.5 cm. wide, pinnate: pinnae 20 to 30 pairs, mostly opposite, ovate to oblong, prominently auricled above and occasionally below, deeply dentate around the entire margin, sessile: sori comparatively long, 5 to 8 on each pinna, oblique, opening toward the midvein midway between it and the margin.

Asplenium canyon, Mule mountains, Cochise county, Arizona, in deep protected canyons, August, 1911. (No. *976*.

This certainly seems distinct from *A. parvulum*, but owing to the weakness of words to express what is evident to the eye, it is here left as a variety.

Asplenium rupium sp. nov.

Roots numerous, long filiform: rootstock short, ascending, covered with rather soft dark scales: stipes short, 1 to 3 cm., green to dark brown: frond elliptical, acuminate at both ends, 15 to 20 cm. long, 4 to 6 cm. wide, pinnate: pinnae 12 to 20 pairs, alternate, oblong, tapering slightly toward the apex, obtuse, broadest at the sessile base, the bases of adjoining pinnae more or less confluent, margins entire: sori linear, 5 to 10 mm. long, 8 to 16 on each pinna, oblique to the midvein and opening toward it: rachis sparingly clothed beneath with scales made up of numerous anastamosing veins; except for these and those of the stipe the plant glabrous throughout.

Asplenium canyon, Mule mountains, Cochise county, Arizona, in rocky protected canyons, no. *969*, August, 1911, and no. *67*, April, 1909.

Apparently an excellent species, found only in the one locality.

Cheilanthes sonorensis sp. nov.

Rootstock creeping, slender, 3 to 4 cm. long, clothed with brown, linear scales: stipes reddish-brown. 2 to 8 cm. long, together with the rachis covered with light brown linear-lanceolate scales: frond deltoid to ovate, quadri-pinnate, 3 to 5 cm. long, 2 to 3 cm. wide: pinnae opposite or alternate, lower deltoid, upper oblong-ovate, tripinnate, ultimate segments linear or cuneate, the entire rolled ends forming the indusia.

La Cienega, Sonora, Mexico, on brushy north slopes, no. *942*, July, 1911.

Notholaena cochisensis sp. nov.

Rootstocks short, very chaffy with long light brown crepe-like scales: stipes tufted, 3 to 5 cm. long, together with the rachises clothed when young with linear, much divided scales resembling tomentum, often becoming glabrate with age: frond linear in outline, 1.5 to 2.5 dm. long, rarely more than 1.5 cm. wide, pinnate: pinnae 20 to 40 pairs, alternate, nearly orbicular, with two or three sinuations to each pinna, the dorsal surface sparingly clothed with a white deciduous stellate pubescence, the ventral surface densely clothed with brown obtuse scales.

Montezuma canyon, Huachuca mountains, Cochise county, Arizona, on rocky limestone ridges, August, 1910, no. *373*.

This species has been passing for *N. sinuata* var., but it is so uniform in its growth and differs so widely from *N. sinuata* that it deserves specific rank. It is uniformly very narrow with small pinnae, in marked contrast to those of *N. sinuata*, and has the lower surface covered with obtuse scales, whereas *N. sinuata* has lanceolate, acute scales.

Notholaena hypoleuca sp. nov.

Rootstock short, clothed with shining reddish-black, linear, acute scales: stipes tufted, 2 to 5 cm. long, light brown, clothed with white powder and lanceolate, acute scales: fronds linear in outline, 10 to 15 cm. long, 1.5 to 2.5 cm. wide, bipinnate, dorsal surface sparingly clothed with white powder, the lower densely, but the powder largely hidden by linear-lanceolate brown scales: pinnae 10 to 15 pairs, alternate, oblong-lanceolate, pinnate: pinnules 4 to 6 pairs to each pinna, oblong, obtuse, broadest at the base: sori brown, continuous around the margins.

Slavonian canyon, Mule mountains, Cochise county, Arizona, on rocky slopes, August, 1911, no. *1004*.

This species is most closely related to *N. Grayi*, from which it differs in the very conspicuous scales on the under side of the frond and several other important features.

Pellaea truncata sp. nov.

Rootstock short, stout, clothed with dark, linear, acute, scarious margined scales: stipes 1 to 2 dm. long, rigid, dark brown and shining: fronds 1.5 to 2 dm. long, 7 to 12 cm. wide, ovate-acuminate to deltoid in outline, glabrous, blue-green, bipinnate: pinnae linear to oblong; pinnules 9 to 19 to each lower pinna and ranging to 3 and 1 at the apex of the rachis, truncate at the base and apex, oblong, 8 to 10 mm. long, 6 to 8 mm. wide, mucro short and scarcely margined; in the mature pinnule the edges rolled in to the midrib.

Mule mountains, Cochise county, Arizona, in dry rocky places, August, 1911, no *977*.

Related to *P. Wrightiana* and *P. ornithopus*, from the former of which it can readily be distinguished by its numerous, short pinnules, and from the latter by its absolutely constant bipinnate character, observed in abundant material.

ALPINE PLANTS—XI

By P. Beveridge Kennedy

Rhodiola integrifolia Raf. Atl. Journ. **1**: 146. 1832.

The illustration represents a typical scene from the alpine flora of the eastern Sierra Nevada mountains at 10000 feet elevation, below a perpetual snow bank which supplies an abundance of moisture. The white portions appearing like snow are granite boulders, over which the alpine heath, *Cassiope Mertensiana*, with its multitude of rose tinted flower bells sometimes creeps.

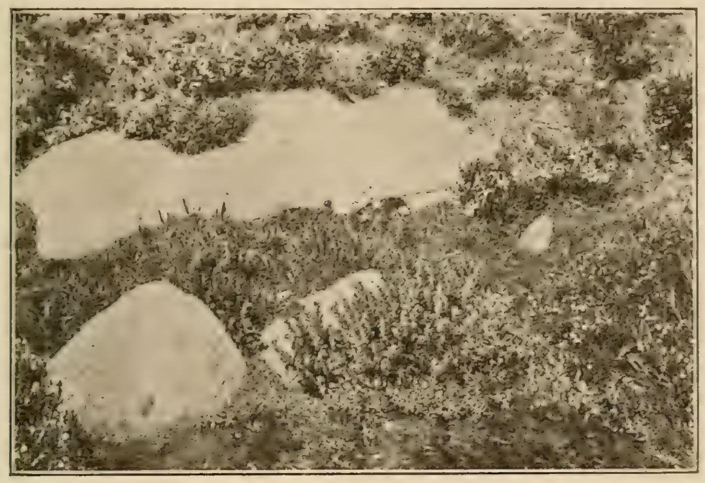


Figure 14. *Rhodiola integrifolia* Raf.

The central clump is *Rhodiola integrifolia*, distributed by us in 1905 as *Sedum roseum*. One is attracted to this plant by its deep reddish-purple flowers and fruits. The leaves also have a purple tinge. Its excellent coloring, together with its strong roots and rootstocks, should make it an excellent addition to our list of alpines for rockeries. We have specimens of it from Mt. Rose, and from the East Humboldt or Ruby mountains in eastern Nevada. The photograph was taken on Mt. Rose in August, 1912.

NEW COMBINATIONS—X.

By A. A. Heller

Alsinopsis gregaria
Arenaria gregaria Heller, Bull. S. Cal. Acad. **2:** 67. 1903.

Alsinopsis Howellii (Wats.)
Arenaria Howellii Wats. Proc. Am. Acad. **20:** 354. 1885.

Alsinopsis laricifolia (L.)
Arenaria laricifolia L. Sp. Pl. 424. 1753.

Alsinopsis macrocarpa (Pursh)
Arenaria macrocarpa Pursh, Fl. Am. Sept. **1:** 318. 1814.
Alsine macrocarpa Fenzl, Verbreit. Alsin. 18.

Alsinopsis occidentalis nom. nov.
Arenaria Nuttallii Pax, in Engler, Jahrb. **18:** 30. 1893; not *Alsinopsis Nuttallii* (T. & G.) Small, 1903.
Arenaria pungens Nutt.; T. & G. Fl. **1:** 179. 1838; not Clem. 1816.

Alsinopsis palustris (Kellogg)
Alsine palustris Kellogg, Proc. Cal. Acad. **3:** 61. 1863.
Arenaria palustris Wats. Bot. Cal. **1:** 70. 1876; not Gay, 1845.
Arenaria paludicola Robinson, Proc. Am. Acad. **29:** 298. 1894.

Alsinopsis pusilla (Wats.)
Arenaria pusilla Wats. Proc. Am. Acad. **17:** 367. 1882.

Alsinopsis tenella (Nutt.)
Arenaria tenella Nutt.; T. & G. Fl. N. A. **1:** 179. 1838.
Greniera tenella Gay, Ann. Sci. Nat. III. **4:** 27.
Alsine tenella Torr. U. S. Expl. Exped. **17:** 243. 1874.

Cheirinia ammophila
Erysimum ammophilum Heller, Muhlenbergia **1:** 51. 1904.

Cheirinia nevadensis
Erysimum nevadense Heller, Muhlenbergia **1:** 52. 1904.

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A. A. Heller,

539 West 5th street, Reno, Nevada

Volume 8 Number 9

MUHLENBERGIA

SEPTEMBER, 1912

Editors: A. A. HELLER and P. BEVERIDGE KENNEDY

Oxyria digyna (L.) Hill

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University of Nevada,
Reno, Nevada

Volume 8 October 31, 1912

MUHLENBERGIA

THE EUPHORBIAS OF TUCSON AND VICINITY

BY J. C. BLUMER

The genus *Euphorbia*, as represented in southern Arizona, is composed entirely of erect or creeping herbs. Strangely enough, this land of cactus possesses no fleshy forms resembling the cacti. For these we must go all the way to south Africa and western Asia. In our region it is one of the richest in species, and, unlike most genera, ranges all the way from the desert to the high mountains. The smaller and the prostrate herbs usually live at lower altitudes, the forms with very small leaves, as is the case in many other groups, being peculiar to the desert. Three species are perennial, and these are small plants belonging to the desert. Several others are summer annuals. All the coarser herbs of erect growth found at various elevations from 2500 to 8000 feet are annuals.

The thirty eight collections made by the writer without paying particular attention to this genus, represent probably twenty eight or twenty nine species. Of these, some nine or ten were found in the Chiricahua mountains; an undetermined one is from the Burro mountains of New Mexico; two more, yet undetermined, come from the vicinity of Nogales on the boundary; four are from the mountains immediately surrounding Tucson, and twelve species were collected in the summer of 1908 at Tucson itself. The different species are more or less closely limited to their own particular region. For instance, apparently none of the Tucson species are found in the Chiricahuas. This is not strange, if we consider the great difference in environment. But *E. dictyosperma* and *E. campestris* of the Rincon mountains, and *E. mollis* of the Santa Catalinas, are replaced in

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the Chiricahuas by *E. crenulata.* They grow under very similar conditions in the same zone, and show the same biological form, yet they are apparently specifically distinct, indicating development along different lines. Among the Chiricahua species are *E. crenulata*, *E. dentata* and several related forms, *E. bilobata*, *E. exstipulata*, *E. stictospora* and *E. serpens.* Of these only *E. bilobata* was recollected near Nogales, and of the Tucson species, *E. Preslii.* Nineteen numbers from Tucson and the surrounding mountains were sent in February, 1910, to Dr. C. F. Millspaugh, of the Field Museum, who very courteously made the determinations as herewith given.

EUPHORBIA VERSICOLOR Greene, Bot. Gaz **6:** 184. 1881.

Desert Laboratory, Tucson, Arizona, September 7, 1908, no. *2504*, Growing near a recent earthdump, and also along the road to the laboratory. It is a small, prostrate, hairy annual, the flowers with a dark center and foliage of a handsome, reddish color. Its habitat and scarcity point to recent introduction.

EUPHORBIA SETILOBA Engelm. Pac. R. R. Rep. **5:** 364. 1857.

Tucson, September 19, 1908, no. *2505.* This hairy, creeping annual with minute leaves, resembles *E. versicolor*, but its corolla lobes are irregularly toothed. It is found on the sands of Tummamoc wash, where it is abundant, varying much in size, flowering plants often being very small.

EUPHORBIA ALBOMARGINATA T. & G. Pac. R. R. Rep. **2:** 174. 1855.

On the rich soil of the flood bottoms of the Santa Cruz river at Tucson, September 30, 1908, no. *2506.* Closely creeping, its long runners or branches often gracefully serpentine. The rather large corollas, and many of its leaves turning red at this season, together with its graceful habit, makes it an attractive plant. Also seen in the yard of St. Mary's hospital, and on Tummamoc wash.

EUPHORBIA PROSTRATA Ait. Hort. Kew. ed. 1, **2:** 139. 1789.

On the Santa Cruz river bottom at Tucson, September 25, 1908, no. *2507.* Creeping in dense mats on silted outwash, under mesquite forest. The plants are pale and bluish beneath, and the flowers very small and inconspicuous.

EUPHORBIA PEDICULIFERA Engelm. Bot. Mex. Bound. 186. 1859.

Tummamoc wash at Tucson, September 19, 1908, no. *2508*. A trailing, deep rooted perennial of the sand banks. Both in form and the variegated coloring of its leaves it is a handsome plant, and is comparatively infrequent. As in *E. setiloba*, also found on the sand banks accumulated and sifted by floods, there is much variation in the size and strength of flowering plants. Undoubtedly this is due to the great variation in the size of the grains in contiguous bodies and layers of sand, and the distribution of moisture and temperature therein.

EUPHORBIA PYCNANTHEMA Engelm. Bot. Mex. Bound. 188. 1859.

At the machine shop of the Desert Laboratory, August 31, 1908, no. *2509*. This plant produces dense and often large mats in recently disturbed and trodden places. The leaves are elongated, and the fruit is rounded, with a purple line on the back of each capsule. In *E. prostrata*, the other densely matted plant of waste places, the leaves are round, and the fruits sharply triangular. The machine shop having been built this spring, the species was introduced then. A somewhat aberrant form was collected on Tummamoc hill, September 30, 1908, no. *2545*, and another at the machine shop on the same date, no. *2552a*.

EUPHORBIA NEO-MEXICANA Greene, Bull Cal. Acad. **2**: 56. 1886.

This little annual bloomed and fruited in gravelly places of the Covillea footslope near St. Mary's hospital as early as the latter part of July, 1908, no. *2510*. At first confused with *E. glyptosperma* on account of its partly erect habit and same general phase of occurrence, it was soon found to be very distinct. It is a true summer annual, inhabiting the calcareous drift slope, while *E. glyptosperma* is a perennial of the residual slope just above, each remaining in its own habitat.

EUPHORBIA GLYPTOSPERMA Engelm. Bot. Mex. Bound. 187. 1859.

North slope near Desert Laboratory, August 31, 1908, no. *2511*. This is *E. capitellata* of Thornber's list, "Vegetative Groups of the Desert Laboratory Domain," in Spalding, Carnegie Institution Publication 113. This is easily the most abundant species about the Tummamoc hills, but well limited to the rocky, basaltic slopes of residual clay soil. While it is not certain that all individuals vegetate twice annually, the species certainly blooms both in winter and in summer, as do many other desert perennials. It has a semi-erect habit, recurved branches, and a perennial root. Typical leaves are trowel-shaped, that is, elongated, rounded at both ends, and slightly tapering toward the apex. Some variants with oblong-linear leaves were found, but these were only two or three in number and could not be separated on any other ground. Evidently it is one of those offshoots more or less definitely exceeding what is known as individual variation, yet by far too small to constitute specific variation. Such cases are frequently found in nature among abundantly represented species.

EUPHORBIA FLORIDA Engelm. Bot. Mex. Bound. 189. 1859.

Tummamoc hill, August 31, 1908, no. *2312*. This is a small, slender, erect summer annual, sparingly furnished with long, linear leaves. The flowers are large for the genus as here represented, the terminal ones nearly white, but the lower subaxillary ones are often of a deep rose color. When suffering for want of moisture the long leaves, ordinarily held in a horizontal or ascending position, become very limp and drop until they hang vertically. The species is well distributed on the stiff soil of the hill slopes with *E. glyptosperma*, but is nowhere abundant.

EUPHORBIA PRESLII Guss. Fl. Sic. Prod. **1**: 539. 1827.

Santa Cruz river bottoms, August 25, 1905, no. *2513*. An erect annual, one to two feet high, abundant in rich, well watered soil of the flood plain. The conspicuously serrate central leaves are much larger than the branch leaves.

EUPHORBIA HETEROPHYLLA L. Sp. Pl. 453. 1753.

On the edge of Santa Cruz bottom near an irrigation ditch, August 31, 1908, no. *2514*. This tall succulent annual is plentiful in certain rich places along the ditches at this season, reaching a height of two feet and more. The very large leaves possess an outline that is quite unique. Anatomy, habitat and season combine to characterize this plant as a monotype.

EUPHORBIA POLYCARPA HIRTELLA Boiss.

On Santa Cruz flood plains, Tucson, September 30, 1908, no. *2546*. On pastured flow land, where it creeps abundantly in mixture with *E. albomarginata*.

EUPHORBIA MOLLIS Engelm.

Santa Catalina mountains, July 8, 1909, no. *3176*. Between Oracle Ridge and the sawmill site, at an altitude of 7800 feet, in the zone of the pines. In flower and fruit. Probably annual.

EUPHORBIA CAMPESTRIS C. & S. Linnaea **5**: 84. 1830.

Rincon mountains at Manning camp, altitude 7900 feet, July 24, 1909, no. *3262*. A handsome annual of erect habit of the type of *E. crenulata*, but quite distinct.

EUPHORBIA DICTYOSPERMA F. & M. Ind. Sem. Hort. Petrop. **2**: 37. 1835.

Manning camp, Rincon mountains, altitude 8000 feet, September 20, 1909, no. *3383*. An annual similar to the preceding, growing in a moist canyon bottom. Best preserved behind a rocky point, which gives protection from the dry, destructive wind sweeping thru open parts of the canyon, where many plants have wilted and shrivelled.

EUPHORBIA MELANADENIA Torr. Pac. R. R. Rep. **4**: 135. 1857.

Base of Rincon mountains, upper end of Rincon valley, July 27, 1909, no. *3278*. This little lowly spreading or slightly raised perennial is very attractive because of the great abundance of its minute, silky gray-green leaves and the profusion of its flowers, whose dark centers contrast pleasingly with the white borders. It should be of value to gardeners as a border plant. The first collection was made in the Tortillita mountains, September 10, 1908, no. *2583*, on open grassy soil near a cliff dwelling. It is one of the most characteristic plants of these granite mountains, so abundant in places that one can not walk without stepping upon it. These two numbers were determined by Dr. Millspaugh. Four other collections of what is undoubtedly the same species were made as follows: Santa Catalina mountains, July 9, 1909, no. *3157*, on an open south slope near the Basin at 4000 feet elevation, and March 16, 1911, no. *4262*, at the entrance to a rocky canyon near the Big Vein Copper Company, at the base of the mountain at 3000 feet. This elevation is that of the Tortillita station, and the soil is similar in all three cases. Baboquivari mountains, April 2, 1910, no. *3654*, near the top of a high ridge south of Coyote Indian village, on a south slope at about 5000 feet. Qui-itowoc hills, February 17, 1911, no. *4216*, on the north slope of a basaltic table mountain at about 2500 feet. Altho the writer has no notes in this particular case, it is quite probable that the species would have been looked for in vain both on the south side of this mountain, and on the north side of the ridge at the preceding station. This is explained in Plant World **14:** 236. 1911. As the dates indicate, it was collected in flower from February to September. While in common with many other perennials in this region of a double rainy season, it probably has two well marked flowering periods annually when the flowers are produced in greater profusion, it is one of the most constant bloomers to be found in the desert.

THE NORTH AMERICAN LUPINES—VIII.

By A. A. Heller

Lupinus apertus sp. nov.

Perennial: stems simple, several from a thick rootstock, 3 or 4 dm. high, leafy, pale or purplish, slightly pubescent below with short appressed hairs, more densely so above: leaflets 8, sometimes less, elliptical-oblanceolate, 4 cm. long or less, the largest 1 cm. wide, the rounded apex tipped with a short mucro, bright green, sericeous with very short appressed hairs which do not hide the green, scarcely paler beneath, but the pubescence denser, pale midvein rather prominent; petioles of largest leaves 2 cm. long; stipules free, subulate, about 1 cm. long: peduncles short, only 3 or 4 cm. long: inflorescence 5 to 12 cm. long, rather lax, flowers whorled, equaling the internodes: pedicels slender, 4 or 5 mm. long: bracts subulate, caducous, a little shorter than the pedicel: upper calyx lip ovate, 4 mm. long, 3 mm. wide when spread out, entire or commonly 2 toothed, the sinus V shaped, 1.5 mm. deep; lower lip 6 mm. long, entire, lanceolate, 2 mm. wide at base when spread out; both lips very concave externally in nature; a bractlet 1 mm. long inserted below the sinus of the lips: corollas pale purplish, rich violet purple or whitish, 12 mm. long and as deep, distance between apices of banner and wings 7 mm.; sides of banner turned back and flaring somewhat in the lower half, the edges 4 mm. apart at the

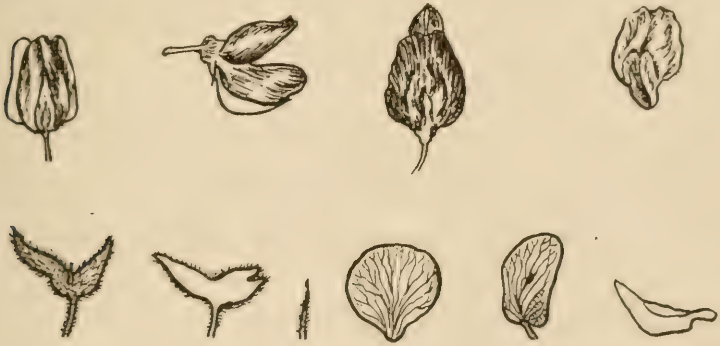

Figure 15. Flowers of *Lupinus apertus* slightly enlarged

apex, 7 mm. at the bottom, face somewhat purple mottled at base; wings 6 mm. deep, upper edges separated by an opening 1.5 mm. wide, the lower edges with an opening 4 mm. wide, exposing the keel, the width of the inflated wings 4 mm.; keel glabrous, strongly curved, 3 mm. deep at the middle, the acute apex purplish: pods and seeds not seen.

The type, in the herbarium of A. A. Heller, is *Heller 6978*, collected July 20, 1903, at Summit, Placer county California, elevation 7000 feet. The type station is a few yards east of the hotel, where the Southern Pacific railroad crosses the Sierra Nevada. Specimens were distributed under the above name in 1903, but publication has been delayed until the relationship of the plant could be determined.

About two years ago Miss Eastwood informed me that it is related to *L. Andersonii.* Since that time I have examined the type of the latter and studied the living plant in the field. *L. apertus* has also been studied in the field on several occasions since 1903. Thousands of plants have been observed, for it is extremely plentiful in the woods below and west of Summit, growing in rich soil in the forest of *Abies Lowiana*, *A. magnifica*, *Pinus monticola* and *P. Murrayana* at 6800 to 7000 feet.

It is quite different in habit from the large, much branched *L. Andersonii* of the eastern side of the Sierras in Nevada, for it has simple stems, and also has slightly smaller flowers of more rounded outline, the parts of different shape, especially the keel, and more silvery, blunter leaves.

I would also refer here *Hall and Babcock 4508*, collected at Gold Lake, Sierra county, altitude 6400 feet, July, 1905.

LUPINUS LEUCOPSIS Agardh, Syn. 29. 1835.

Since Watson's treatment of the genus in Proc. Am. Acad. 8: 517-548. 1873, this name has passed as an unquestioned synonym of *L ornatus.* Agardh's description reads as follows:

"*L. leucopsis nob.* albido-sericeo-tomentosus; foliolis 7-9 lanceolatis petiolum aequantibus, stipulis subulatis brevibus, floribus in racemo densiori subverticillatis, bracteis caducissimis, calyce bracteolato, vexillo extus subsericeo, leguminibus tomentosis.

"HAB. In America Boreali-occidentali legit *Douglas*. Specimina misit Lindley.

"Caulis elatus, ramosus, pluripedalis, tomento densissimo albidus. Foliola 7-9, lanceolata, supra medium latiora, acuminato-mucronata, subcanaliculata, utrinque densissime sericeo-villosa, longitudine petioli. Stipulae supra medium adnata. Flores irregulariter verticillati, pedicellati. Bracteae. . . . Calyx bracteolatus, labio superiore bidentato, inferius integrum subaequante. Corollae coeruleae, L. perennis majores. Legumina tomentosa, 4 sperma."

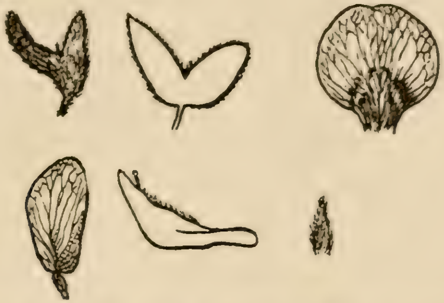

Figure 16. Floral parts of *Lupinus leucopsis*, enlarged

Agardh had seen a specimen of *L. ornatus* in the herbarium of Lindley, and indicates the relationship by placing it just before *L. leucopsis*. He indicates that *leucopsis* is more pubescent, has fewer leaflets lanceolate instead of obovate-linear, equaling the petiole instead of only half the length; shorter stipules; the racemes denser, imperfectly verticillate; the outside of the banner less pubescent, and the pods more pubescent.

Among specimens sent to Miss Eastwood for comparison with the types in England was my *10178*, collected along the river bank at Pendleton, Oregon, June 3, 1910. She reported that it is *L. leucopsis*, "but not a synonym."

Lupinus mollis sp. nov.

Perennial, soft white villous throughout except the flowers: stems several from a thick rootstock, 3 to 4 dm. high, leafy: leaflets 7 to 9, spatulate or oblong-oblanceolate, 4 cm. long, 8 mm. wide, the rounded apex with a short mucro, the pale midrib rather prominent; petioles stout, 4 cm. long or less; stipules free, subulate, 5 mm. long: peduncles about 6 cm. long: inflorescence 10 to 15 cm. long, rather dense, the flowers in whorls, violet purple, the face of the banner pinkish, turning brown when dry: pedicels 5 mm. long: bracts lanceolate, acuminate, 5 mm. long, 1 mm. wide at base, caducous: upper calyx lip ovate when spread out, 4 mm. long and as wide at base, 2-toothed, the narrow V-shaped sinus 1 mm. deep; lower calyx lip lanceolate, entire, 6 mm. long, 3 mm. wide at base: corollas 1 cm. long, 8 mm. deep, distance between apices of banner and wings 2 mm.; banner rounded and gibbous at base, but hardly spurred, the sides turned back and somewhat inrolled, the short face with a narrow groove, the apex on the dorsal side with a sort of keel, the whole broadly obovate, 1 cm. wide; wings inflated to about 5 mm., and 5 mm. deep, the upper edges almost meeting, a channel on either side, the lower edges apparently wholly inclosing the keel; keel glabrous, very strongly curved, 3 mm. deep at the middle: pods and seeds not seen.

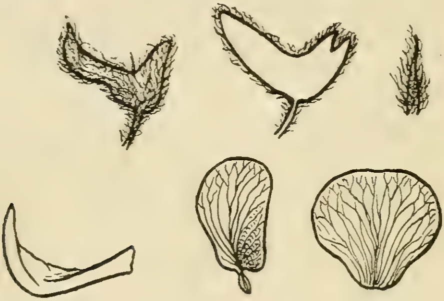

Figure 17. Enlarged floral parts of *Lupinus mollis.*

The type, in the herbarium of the Nevada Agricultural Experiment Station, is *Heller 10080*, collected on grassy hills at the Dalles, Wasco county, Oregon, May 23, 1910.

This species is related to *L. nevadensis* Heller, Muhlenbergia **6:** 107, but has smaller flowers of a different shape though of the same type, rounded in outline, the banner and wings close together, the face of the banner turning brown in drying. It would be classed among the Saxosi according to pubescence in Piper's Flora of Washington.

While the grouping of the lupines into sections in Piper's Flora of Washington is excellent as a whole and an advance in the right direction, the dependence placed upon pubescence is a serious defect. *L. mollis*, described in this paper, should belong to the Saxosi, so far as pubescence is concerned, yet I am convinced its flowers are not at all like those of *L. saxosus*. I have in mind an apparently undescribed plant related by floral characters to *L. mollis*, but with a sericeous pubescence. While in some groups the pubescence may be fairly uniform, we must, as a rule, look for stronger characters. These may be found in the flowers. The seeds are often distinctive, but can not be depended upon, as they may vary considerably in a group, and again may be practically similar in several distinct groups. A lupine specimen in fruit only is not specially desirable, unless a flowering one can be obtained from the same place, provided its identity is uncertain.

The chief trouble with the lupines is not that they are so extremely difficult to place, but that they have neither been properly studied nor well described. Most lupine species are local in distribution, but an attempt has been made to read into them related species occupying other areas, or even species not very closely related. Most descriptions show that the flowers have not been dissected, or if they were, the characters not described. Even in dried unsoaked examples the difference between a flower having banner and wings pressed together with little space between their apices, and one having the banner reflected well away from the wings is easily noted. Yet mention of just such characters is almost unknown.

Lupinus yukonensis Greene, Leaflets **2**: 233. Oct. 22, 1912, is evidently a synonym of *L. borealis* Heller, Muhlenbergia **8**: 82. Aug. 10, 1912. While Dr. Greene does not cite the collection number, it is evident from the date and place that both names are based upon the same plant.

ALPINE PLANTS—XII

By P. Beveridge Kennedy

Alpine Sorrel

Oxyria digyna (L.) Hill, Hort. Kew. 158. 1768.
Rumex digynus L. Sp. Pl. 337. 1753.
Oxyria digyna Camptdera, Rumex 155. *pl. 3. f. 3.* 1819.
Oxyria reniformis Hook. Fl. Scot. 111. 1821.

Our illustration represents one of the few plants that are found growing indigenously in both the eastern and western hemispheres. It is found on all the great mountain ranges of Europe and Asia. On the North American continent it ranges from Greenland, Labrador and the high mountains of the New England States to Alaska, thence south through the Rocky mountains and the Cascade and Sierra Nevada ranges. It also occurs on the high peaks of the Great Basin region.

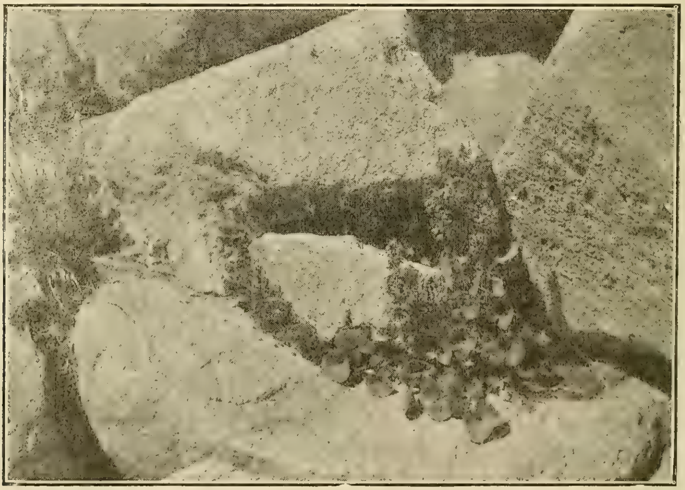

Figure 18. Oxyria digyna (L.) Hill

The thick and long roots penetrate deeply among the crevices of the lava rocks, indicating its excellent qualifications for rockery purposes. The bright red fruits contrasting with the green leaves make it an exceedingly ornamental plant. The photograph was taken on Mt. Rose, Washoe county, Nevada, in August, 1912, at an elevation of about 10000 feet.

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539 West 5th street, Reno, Nevada

Volume 8 Number 10

MUHLENBERGIA

OCTOBER, 1912

Editors: A. A. HELLER and P. BEVERIDGE KENNEDY

Castilleja inconspicua Nelson and Kennedy

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University of Nevada,
Reno, Nevada

Volume 8 December 7, 1912

MUHLENBERGIA

THE NORTH AMERICAN LUPINES—IX.

BY A. A. HELLER

ALBIFRONDES

Shrubs, rarely herbaceous perennials, with a silky or sericeous pubescence: the petioles but little longer than the blades: calyx densely silky, bracteolate: corollas some shade of violet, large, 1 cm. or more long, and nearly as deep, the face of the banner standing well away from the wings, often white or yellowish, edges turned back, but usually separated by a space 4 or 5 mm. wide, especially at the base. Pacific coast plants, inhabiting open slopes and roadside banks at low or medium elevations; never strictly silvan.

The species of this group, as many as were described at the time, were included under Agardh's tribe Paniculati. But since the Peruvian *L. paniculatus* is not known to me, and since he also included certain of our species which do not belong in the group, as here limited, I have not adopted Agardh's name.

L. ALBIFRONS Benth.; Lindl. Bot. Reg. **19:** *pl. 1642.* 1833.

This species as at present understood is probably an aggregate. At least two forms are found in the bay region of California. One has a distinct woody trunk rising several feet above the ground, while the other is made up of many slender decumbent woody branches, from which the seasonal growth arises, the whole plant rarely taller than the trunk of the first form. Agardh, in his Synopsis, and Bentham in Trans. Hort. Soc. II. **1:** 410. 1835, describe the stem as decumbent. The exact type station is not known, but the plant is probably restricted to middle California.

LUPINUS DOUGLASII Agardh, Syn. 34. 1835.

This is readily distinguished by its narrow, practically linear leaflets. My *6590*, collected on the Carmel river in 1903, distributed as *L. albifrons*, is typical. One of the specimens with an unopened flower cluster shows subulate bracts longer than the calyx. Carmel may well be the type locality, as Monterey, only a few miles distant, was the headquarters of Douglas while in California. The species ranges from Monterey to the Santa Ynez mountains back of Santa Barbara.

LUPINUS FALLAX Greene, Erythea **2**: 119. 1894.

A shrub, so far found only on Mt. Tamalpais, near San Francisco. It too has very long bracts, but much broader leaves than *L. Douglasii.*

LUPINUS EMINENS Greene, Erythea **1**: 125. 1893.

This differs from *fallax* in having flowers scarcely whorled banner shorter than the wings, glabrous keel, and shorter and fewer seeded nearly erect instead of spreading pods, the pubescence more spreading.

LUPINUS BRITTONI Abrams, Bull. N. Y. Bot. Gard. **6**: 391. 1910.

This species, known only from San Diego county, California, is distinquished by the very short appressed pubescence, appearing glaucescent rather than silky. Like *eminens*, the flowers are not distinctly whorled. The seeds are small for the group, light tan with darker spots.

LUPINUS JUCUNDUS Greene, Manual 106. 1894.

Known so far only from Solano county, California, the type grown at Berkely from seed obtained in Gate's canyon.

LUPINUS LONGIFOLIUS Abrams, Fl. Los Angeles 209. 1904.

Probably not the plant that Watson named as variety *longifolius* of *L. Chamissonis*, and which, like most varieties, is so poorly characterized, that determination is impossible. This is a more inland plant than *Chamissonis*, has a different pubescence, a loosely flowered inflorescence, upper calyx lip more cleft, the white face of the banner changing to rose-purple instead of remaining yellow, and the keel ciliate. It ranges from Los Angeles county south to San Diego.

LUPINUS CHAMISSONIS Esch. Mem. Acad. Petersb. **10:** 288 1826.

A sand dune species common about San Francisco, where it was first collected. I have seen it as far north as Bodega bay in Sonoma county, and it is said to extend as far south as Orange county. Common on the dunes beyond Del Monte and to Monterey, it is strangely absent about Pacific Grove and from Point Pinos. Some of the leaves turn fuscous with age. The face of the banner retains the yellow spot, and the keel is glabrous.

LUPINUS COLLINUS (Greene) Heller, Muhlenbergia **2:** 292. 1907.

This differs from all the other Californian members of the group in having herbaceous stems and no woody trunk, merely a thick rootstock which sometimes develops short creeping woody stems. It has smaller and narrower leaves than *L. albifrons*, with which it was first associated as a variety, and the keel is glabrous instead of ciliate. The typical plant is found only on the hills about San Francisco, but I have provisionally referred to it a plant from Mt. Hamilton and neighboring ridges.

Lupinus acutilobus sp. nov.

A shrub (§ Albifrondes) about a meter high: herbaceous branches including the inflorescence about 3 dm. long, silky sericeous, as are the leaves, pedicels and calyx, very leafy: petioles little longer than the leaflets, these 7 to 9 in number, oblong or oblong-spatulate, the larger ones of the middle part of the stem 3 cm. long, 6 mm. wide, some of the upper and lower little more than half that length but nearly as wide; clusters of smaller leaves in the axils; stipules narrowly lanceolate, acuminate, 6 or 7 mm. long, nearly free, or the lowermost 1 cm. long, half free: peduncles rather stout, 3 to 8 cm. long: inflorescence about 1 dm. long, the flowers whorled, equaling the internodes: pedicels stout, 5 or 6 mm. long: bracts lanceolate-acuminate, 6 mm. long, 2 mm. wide at base: upper calyx lip 6 mm. long, nearly 5 mm. wide when spread out, parted to the middle, the sinus broadly V-shaped, the acuminate apices slightly divergent; lower lip nearly 8 mm. long, 3 mm. wide at base, 1.5 mm. at the 3-toothed apex; a bractlet 3 mm. long inserted a little below the sinus: corollas deep violet-purple, large, 15 mm. long, 13 mm. deep, a space 7 mm. wide between apices of banner and wings; banner darker than the wings when dry, its face 7 mm. long, rather narrow, edges turned back and apparently nearly meeting, the back glabrous, the whole almost orbicular when spread out, 13 mm. wide; wings moderately inflated, probably not more than 6 mm., but very broad, 9 mm. deep and broadly rounded toward the apex, completely inclosing the keel on the lower side; keel glabrous, rather strongly curved but not rectangular, 4 mm. deep at the middle, the acuminate purple apex slightly protruding from the apex of the wings in the mature flower: ovary densely white silky.

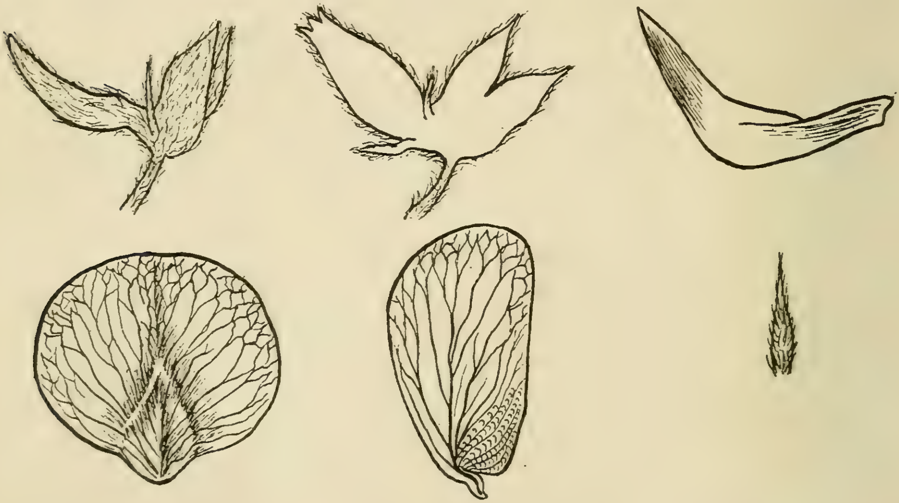

Figure 19. Floral parts of *Lupinus acutilobus*, enlarged

The type, in the herbarium of A. A. Heller, is an unnumbered specimen collected by myself on the rocky slope of East Butte, Marysville Buttes, in the Sacramento valley, California, May 16, 1902.

In leaf shape this handsome, very large flowered species is more related to *L. fallax* and *eminens* than it is to *albifrons*, but seems quite distinct. The smaller and fascicled leaves are beautifully fuscous, just as they are in *L. Chamissonis*, which it resembles in no other particular.

My *7849*, collected near Redding, Shasta county, and *5501*, collected in Berry canyon between Oroville and Chico, Butte county, are probably referable to this species, but they have somewhat smaller flowers, and the leaves of *5501* are shorter and broader in proportion.

Lupinus fissicalyx sp. nov.

Perennial (§ Albifrondes): stems several from a thick caudex, 5 or 6 dm. high, sericeous, as is the whole plant, especially the leaves and calyx, leafy: petioles of the middle part of the stem about 4 cm. long, the upper and lower somewhat shorter; leaflets 7 to 9, oblanceolate or spatulate, 3 cm. long, 8 mm. wide, the rounded apex with a short mucro; stipules subulate, 5 or 6 mm. long, nearly free, only the lowermost 1 cm. long with the upper third free: peduncles 4 or 5 cm. long: inflorescence 2.5 dm. or less, the flowers verticillate, equaling or somewhat exceeding the internodes: pedicels rather slender, 7 mm. long: bracts very caducous, subulate, 5 mm. long, 1 mm. wide at base: upper calyx lip 6 mm. long, 4 mm. wide when spread out, cleft for 4 mm., the sinus narrow, lobes acuminate; lower lip 7 mm. long, lanceolate, entire, 3 mm. wide; a subulate bractlet 1.5 mm. long in the sinus: corollas pale violet-purple, 12 mm. long and as deep,

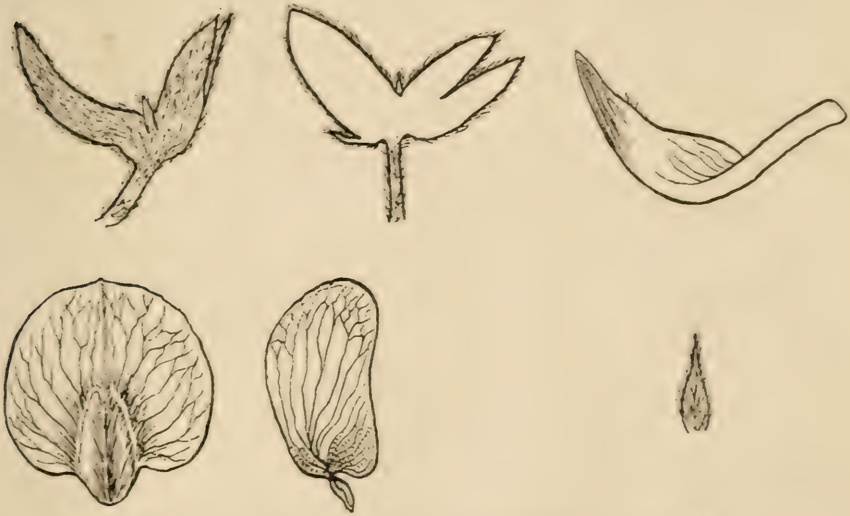
Figure 20. Floral parts of *Lupinus fissicalyx*, enlarged

a space 4 mm. wide between apices of banner and wings; face of the banner yellowish, 5 mm. long, deeply channeled, edges turned back, somewhat flaring at base where they are about 7 mm. apart, 3 mm. at the apex; wings narrowly inflated, 3 mm., the upper edges closed, the lower open for nearly the whole length, exposing the keel, width 6mm. when spread out, broadly rounded from the middle to the apex; keel strongly curved, glabrous, 3 mm. deep at the middle, the acuminate apex purple.

The type, in the herbarium of the Nevada Agricultural Experiment Station, is *Heller 10025*, collected May 16, 1910, at Grant's Pass, Josephine county, Oregon. It is not closely related to any of the other Albifrondes, no part of the stem being at all woody. However, I have decided to admit it to the group on account of its agreement in pubescence, form of flower and leaf shape.

Lupinus amabilis sp. nov.

Perennial: stems several from a woody caudex, about 5dm. high, purplish and rather smooth looking, but appressed pubescent under a lens, moderately leafy: lower petioles long, 15 to 17 cm., the upper about half that length; leaflets about 9, oblong, attenuate at base, narrowed and cuspidate at apex, 5 cm. long, 5 mm. wide, yellow-green and glabrous above, (dull green and appressed pubescent beneath; stipules lanceolate-acuminate, the lowermost 15 mm. long, free for half their length, the uppermost 5 mm. long, nearly free: peduncle 5 or 6 cm. long: inflorescence 1.5 to 3 dm. long: flowers verticillate, equaling the internodes, rich violet purple: pedicels 5 or 6mm. long, slender, silky sericeous, as is also the calyx: bracts ovate, acuminate, 4 mm. long, 2.5 mm. wide: upper calyx lip 2 mm. long, rounded when spread out, shallowly notched; lower lip 5mm. long, ovate, acute, entire, with a prominent midvein; bractlet in the sinus a small rounded appendage terminating a rib which extends up from the base of the calyx: corollas 9 mm. long, 6 mm. deep, gibbous at base but hardly spurred, a space of 2 mm. between apices of banner and wings; face of banner 3 mm. long, rather broad with a broad deep groove, edges somewhat turned back, flaring at base;

wings inflated 3 mm., two-thirds of their length covered by the banner, 3 mm. deep, the lower edges united only at the apex but meeting and concealing the keel except for a small space above the calyx; keel glabrous, broad for the flower, 3mm. deep, the width well sustained toward the acute purple apex.

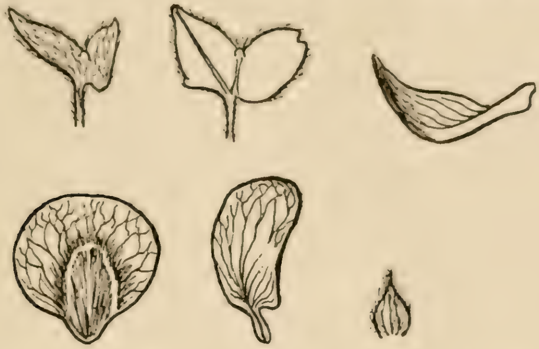

Figure 21. Flowers of *Lupinus amabilis*, enlarged

The type, in the herbarium of the Nevada Agricultural Experiment Station, is *Heller 10043*, collected May 18, 1910, at Eugene, Lane county, Oregon, where it was abundant in clayey soil on the railway embankment south of the town.

The relationship of this beautiful species is uncertain, but it should probably be referred to the group of which *L. laxiflorus* may be taken as the type. Geographically it has better claims to the name *stenophyllus* than my *10554* and other plants referred by Dr. Rydberg to that species, but differs so much in general appearance from Nuttall's type that I can not well consider it identical.

The structure of the calyx is the most peculiar so far observed, on account of the insertion of the bractlet and the keel or midvein showing so prominently on the interior of the lower lip.

Lupinus obtusilobus sp. nov.

Perennial, silky sericeous throughout: stems in clumps from short rootstocks, 2 dm. high, leafy: petioles about the length of the leaflets; leaflets 5 to 7, elliptical-oblong, 3 cm. long, 6 mm. or less wide, the acutish apex with a short mucro; stipules subulate, free, 4 mm. long, very silky villous: peduncles 3 cm. long: inflorescence about 5 cm. long, the flowers verticillate, dense: pedicels rather stout, 3 mm. long: bracts lanceolate, acuminate, 6 mm. long, 1.5 mm. wide: upper calyx lip 5 mm. long, 4 mm. wide when spread out, broadly notched, the lobes rounded; lower lip 6mm. long, 3mm. wide, 3-toothed; a subulate bractlet 1mm. long in the sinus: corollas violet-purple, 1 cm. long and as deep, a space 4 mm. wide between apices of banner and wings; banner broader than long when spread out, the face 5 mm. long, deeply grooved, edges apparently but little turned back; wings moderately inflated, exposing the keel for a short distance only, the lower edges well rounded, 7 mm. deep at the middle; keel moderately curved, 4 mm. deep, somewhat ciliate throughout, the acuminate apex purple.

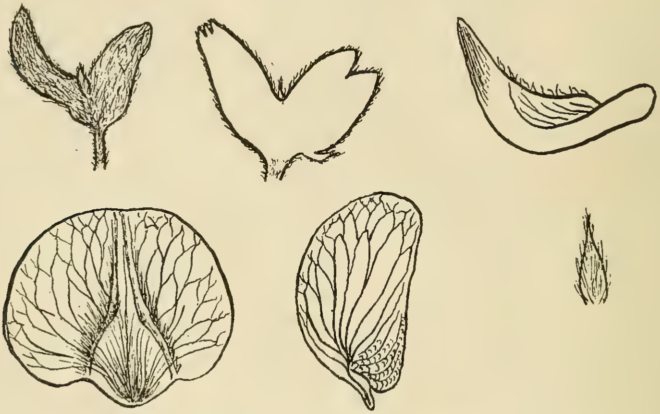

Figure 22. Floral parts of *Lupinus obtusilobus*, enlarged.

The type, in the herbarium of A. A. Heller, is *George B. Grant 730*, collected on Mt. Shasta, California, at an altitude of 8000 feet, September, 1902, distributed as "*Lupinus ornatus* Auct." It bears but little resemblance to *L. ornatus* of eastern Washington and northern Idaho. It was also collected on Mt. Shasta, August 15, 1903, by *Copeland*, distributed by C. F. Baker under no. *3918* as "*Lupinus Andersonii* Gray," a species local in the mountains of western Nevada, and not as yet detected in California.

FIVE DWARF LUPINES

By Edward L. Greene

Lupinus fruticulosus

Low diffuse undershrub, either fastigiately branched from the base and 6 or 7 inches high, or more depressed and matted, the mat 6 to 10 inches across: leaves many, small, but on long slender petioles; leaflets 5 to 7, rather broadly oblanceolate, acute, the largest only ⅔ inch long, the pubescence of both faces rather short, silky, appressed, not so dense as to conceal the green of the foliage altogether: racemes short, of 5 or 6 crowded verticils, but borne above the foliage on very slender peduncles: corolla purple, the petals not unequal, the banner broad and upright; keel with a margin of short dense implexed white wool: pod short, silky, 1 to 3-seeded.

Apparently common in Klamath county, southern Oregon, where it was gathered in the matted state by *Coville and Applegate*, 31 July, 1897, and in the more upright typical form by *Mrs. R. M. Austin*, 9 August, also 1897. All give Annie Creek Valley as the special habitat of this, which must be a handsome species.

Lupinus perditorum

Of the size of the last, the parts as slender, much more loosely or not at all matted: leaflets ½ inch long, oblong rather than oblanceolate, the pubescence more scanty and less appressed: racemes narrow, more elongated, the small deep purple flowers not in verticils: banner short, smaller than the very broad and conspicuous wings; keel rather narrow and subfalcate, shortly woolly-margined.

In dry openings in woods along Rogue river, Jackson county, Oregon, 8 July, 1898, *E. I. Applegate;* type on U. S. Herbarium sheet *361817*.

Lupinus abortivus

Dwarf perennial, the very numerous branches densely tufted on the shortly branched crown of a cylindrical taproot, but all apparently suberect rather than at all depressed, 6 inches high, rather slender, all herbage clothed with a rather coarse but soft villous and appressed coat, this brownish: petioles very long and slender; leaflets about 7, oblanceolate, acute, very unequal, ¼ to ¾ inch long: racemes peduncled yet hardly borne above the foliage: corolla apparently light blue-purple; petals very unequal, banner greatly reduced, of barely two-thirds the length of the wings and hardly spreading away from them; the short keel closely woolly ciliate.

This is another of Mr. Leiberg's choice gatherings of 1896, made in a remote part of southeastern Oregon; this one from near Stinking Water, 21 June. The name I have assigned this new species is not appropriate except as relating to the reduced banner petal. The plant is copiously floriferous and must be rather beautiful among the dwarfs of the genus. The type specimen is on U. S. Herbarium sheet *275613*.

Lupinus volutans

Stout depressed dwarf perennial, all the herbage rough with a subfuscous hirsute pubescence, a dense short tomentum underlying the shaggy coat: all the short thick branches densely leafy with a long-petioled foliage, the largest of the 5 to 7 leaflets 1 inch long, rather broad, subcuneate-elliptic, obtusish: racemes short, compact, only in part surpassing the foliage, the rachis and calyx densely villous hirsute and fuscous: corolla small, light purple: banner rather narrow and hardly erect; keel short, not falcate, the margin densely white woolly from below the middle to the apex.

Malheur Valley, in arid southeastern Oregon, collected 8 June, 1896, by J. B. Leiberg, and not otherwise known; type on U. S. Herbarium sheet *276551*. It appears to have grown in dry clayey or alkaline soil, and the dust of this adheres to all the basal parts of the plant, as if it had wallowed in it, hence the specific name.

Lupinus crassulus

Plant stout and low, the flowering branches stout, herbaceous and somewhat fleshy, resting on a thick tough but somewhat ligneous partly subterrenean caudex, suberect, very leafy, the short racemes many, borne hardly above the foliage: petioles stoutish, much longer than the leaves and loosely villous hirsute; leaflets about 7, unequal, very broad, cuneate-oblong, the longest about ½ inch long, almost hoarily villous hirsute, most so beneath: racemes peduncled, but the peduncles not quite equaling the foliage: flowers small and crowded, yet apparently verticillate; petals equal, in the main deep blue, the whole middle of the banner at first deep yellow, changing to deep blue; keel broad, not falcate, somewhat bristly ciliate, the hairs not closely approximate, but of a length very unusual: pod and seeds not seen.

Collected 5 August, 1912, at an altitude of 10500 feet in the Stanislaus forest reservation, California, by *J. H. Hatton;* evidently a subalpine and partly shrubby lupine, yet in aspect and character most unlike the other suffrutescent species of the high Sierra, its stoutness and fleshiness suggesting some of the coarser annual species of the Coast Range and seaboard, yet a thorough perennial, and even suffrutescent.

ALPINE PLANTS—XIII

BY P. BEVERIDGE KENNEDY

ALPINE PAINTED CUP

CASTILLEJA INCONSPICUA Nelson and Kennedy, Proc. Biol. Soc. Wash. **19:** 38. 1906.

The inconspicuous flowered Castillejas now form a considerable group, some of which were originally placed in the genus Orthocarpus, while others, such as *Castilleja Lemmoni*, were treated as Castillejas. They seem without doubt to be a connecting link between the two genera. All are perennials with strong tap roots, from which come out numerous short stems from two to eight inches in length. The leaves are divided and subdivided into linear lobes.

Our illustration represents *C. inconspicua.* This species has been found only on Mt. Rose, Washoe county, Nevada, where it is common from 9000 to 10000 feet elevation, but is found more sparingly even on the summit, at 10800 feet. It is found in both the granite and volcanic formation. As in most of the species of Castilleja it is variable in coloring, but the prevailing hues are a mixture of cream and purple, with a very prominent deep purple spot, the stigma, appearing when young like an eye.

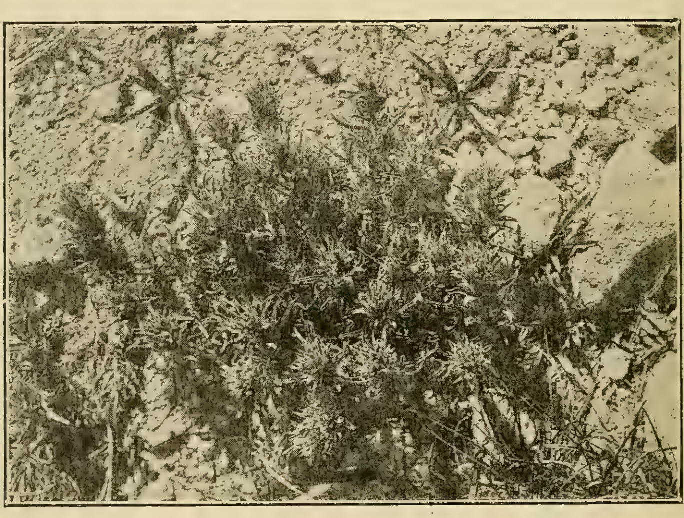

Figure 23. Castilleja inconspicua Nelson and Kennedy

The high mountain species of the Sierras proper seems to be *C. ambigua* Jones. *C. lapidicola* Heller, from the Ruby or East Humboldt mountains, Nevada, resembles *C. inconspicua* in general habit and appearance, but has a very different floral structure. The following species no doubt also belong to this group: *C. puberula* Rydb.; *C. rubida* Piper; *C. pilifera* A. Nelson; *C. villosa* Rydb.; *C. pilosa* (Wats.) Rydb.; *C. nana* Eastw.; *C. pallescens* (Gray) Greenm.; *C. longispica* A. Nelson; *C. Lemmoni* Gray; *C. arachnoidea*, *C. oresbia* and *C. schizotricha* Greenm.; *C. pratensis* Heller; *C. brachyantha* Rydb.; *C. Covilleana* Henderson.

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A. A. Heller,

539 West 5th street, Reno, Nevada

Volume 8 Number 11

MUHLENBERGIA

NOVEMBER, 1912

Editors: A. A. HELLER and P. BEVERIDGE KENNEDY

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Fruiting branch of Abies Lowiana

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University of Nevada,
Reno, Nevada

Volume 8 December 27, 1912

MUHLENBERGIA

THE CALIFORNIA WHITE FIR

By A. A. Heller

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GARD

Abies Lowiana Murray, Syn. Var. Conif. 27. 1850.

This fir is commonly included under *Abies concolor*, and may not be distinct. Sudworth, in Forest Trees of the Pacific Slope 117, says: "The long maintained *Abies lowiana* Murray (cultivated in England, where it was first described), the *Abies concolor lowiana* of American authors, is a form of the white fir distinguished mainly by the length of its leaves."

Britton, in North American Trees 79, notes that "Low's fir, *Abies Lowiana* A. Murray, which occurs in the region of Mt. Shasta and southward in California, is considered by some a distinct species; its leaves are darker green and the cones chestnut brown."

Lemmon, in Third Biennial Report of the California State Board of Forestry 148-149, maintains *A. Lowiana* as distinct, but offers very little in the way of proof except that *concolor* has paler leaves. On page 138 he puts *Lowiana* under "leaves twisted at base," and *concolor* under "leaves not twisted at base." If this held good it should have considerable weight, but a specimen now before me, collected in the Mogollon mountains, New Mexico, exidently from a young tree, or at least a lower branch, has a slight twist to the leaves. The leaves on the lower branches, especially of young trees of *A. Lowiana*, are much less twisted than are those on the old fruiting branches of the upper part of the tree. The leaves of the New Mexican tree are much paler than are those of our Nevadan trees, are thinner, more pointed, flat on both sides, with indistinct lines or channels. Leaves from the lower branches of trees near Reno are

JAN 4 - 1913

bright green, thick, distinctly channeled above, ridged beneath, with a channel on each side of the ridge, the apex commonly blunt and rounded.

Some two years ago when the question of identifying our white fir came up, I was much confused by the varying descriptions of *A. concolor*, but finally decided that it must be that species, but not agreeing altogether with any of the descriptions.

In Sargent's Manual the leaves of *A. concolor* are described as follows: "On lower branches flat, straight, rounded, acute or acuminate at the apex. . on fertile branches and on old trees frequently thick, keeled above, usually falcate, acute, or rarely notched at the apex."

Sudworth, in Forest Trees of the Pacific Slope 116, says: "Young foliage of the year is yellow-green, with a bluish cast, but later it turns to a pale yellow-green, with a whitish tinge. The leaves are flat, straight, and full and plump on the upper side, blunt or pointed—usually not prickly, but sometimes prickly on the lower crown branches of old trees. They stand out distinctly from the two sides of the lower branches by the twist in their bases; but very commonly the lower branches of young trees have their leaves curved and standing erect, somewhat in two lines, from the upper sides of the twigs. Leaves of the upper crown, especially on the topmost branches, are strongly curved or sickle-shaped, and appear to grow from the upper sides of the branchlets. These leaves and those on leaders are sharp-pointed. Lower branch leaves are usually longer (1 and a third to 3 inches long) than those of the upper branches, which are commonly about 1 to 1 and a third inches long. There is very great variation in the length, form, and thickness of leaves of this fir in different parts of its wide range. The changes in form from horizontally flattened leaves to vertically flattened ones, or to those resembling a sickle-blade, are curious; they are unexplained, except perhaps by the fact that the latter form is best adapted to the dry climate in which it most often occurs. Some authors hold that Rocky Mountain trees bear longer leaves, and more commonly pointed ones, than do trees of the Pacific forests. The writer has seen trees in the latter region with quite as long leaves, while long blunt leaves are not infrequent on trees of the eastern range."

In this connection it may be noted that last summer young trees were found near Franktown, Nevada, at at altitude of 5600 feet having leaves horizontally spreading, while scattered among them were other trees of the same age, growing under identical conditions, but having their leaves upcurved.

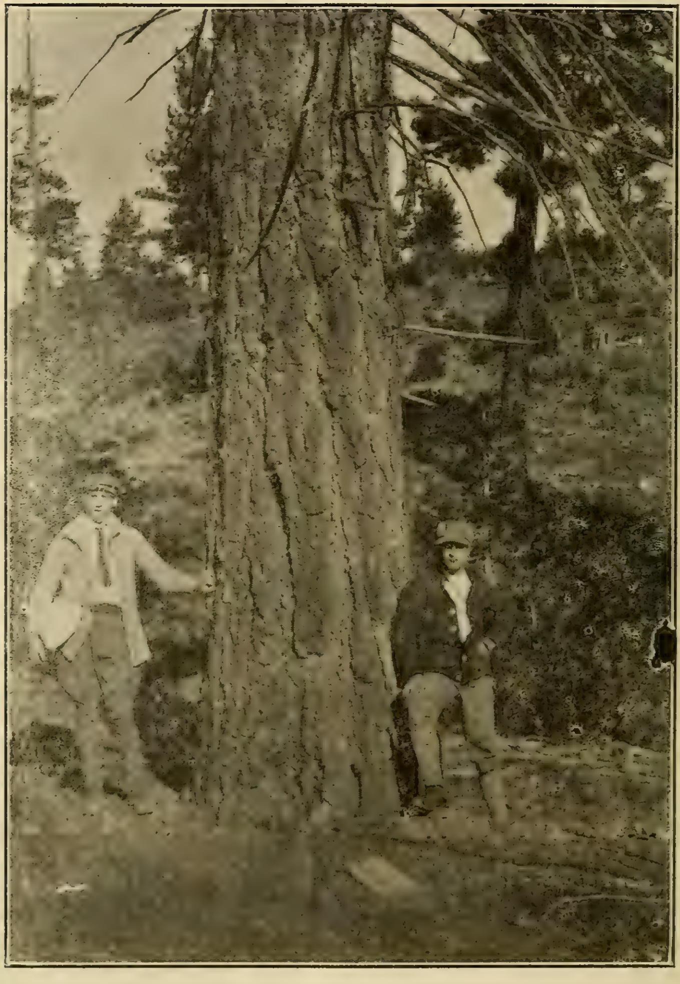
Britton describes the leaves as "flat, linear, 3 to 6 cm. long, pale bluish green, often with a bloom when young, dull green with age, slightly channeled above, rounded or slightly notched at the apex on the lower branches, shorter, thicker, erect and curved on the upper fertile branches."

The cones are variously described as yellow, green, purple, or brown. With us they are light brown when fully mature, at least the long-persisting ones sometimes found late in November on young trees about thirty-five years old. These are usually not more than two inches long, about half the size of cones from mature trees. Full grown fresh cones have a greenish tint, due to the coloring of the dense puberulence amounting almost to down, on the apophyse or small exposed portion of the end of each cone scale. This apparently changes to brown with age on the tree, or may be brown from the beginning in some cases. Both sides of the scale, especially near the base, are more or less arachnoid pubescent.

Since the description given by Jepson in Silva of California 119, is no doubt drawn wholly from Californian material, I give it in full as it is appropriate for our western tree whether it be called *Abies Lowiana* or *Abies concolor.*

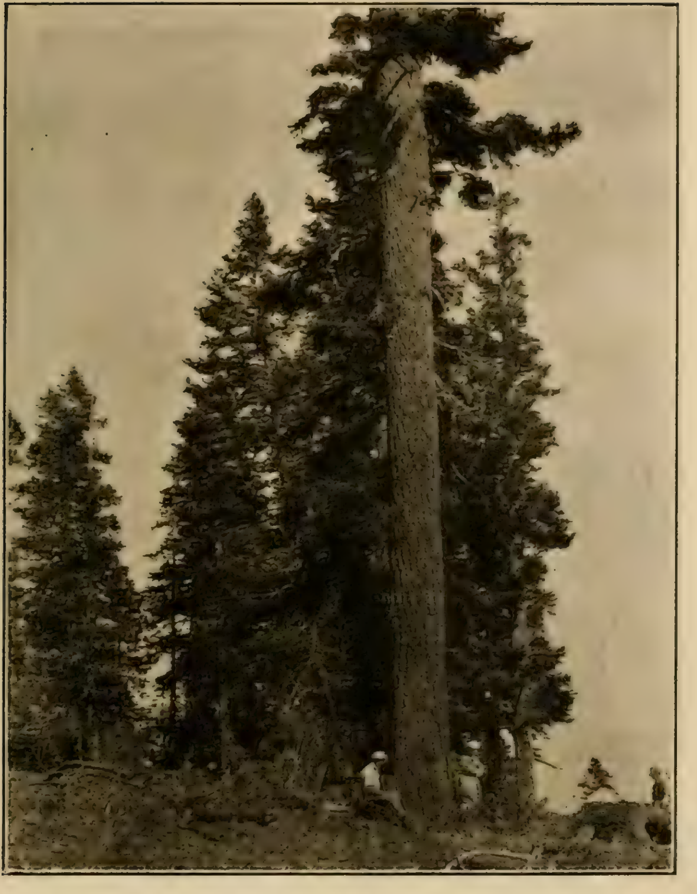
"Forest tree 60 to 150 or 200 feet high, with a narrow crown composed of flat sprays and a trunk naked for one-third to one-half its height and 1 to 6 feet in diameter; bark smooth, silvery or whitish in young trees, becoming thick and heavily fissured into rounded ridges on old trunks and gray or drab-brown in color, in section showing dull brown areas seperated by a coarse light-colored mesh; leaves 2 to 2½ (commonly 1 to 1½) inches long, flat, often with a median channel on upper side, or on the uppermost branches keeled, a prominent midrib beneath with a

Plate 13



Abies Lowiana. Mature trunk, mountains north of Verdi, Nevada

Plate 14



Abies Lowiana. Mature tree west of Hunter creek near Reno, Nevada broad depressed stomatal band on either side, contracted at base into a very short petiole, acutish, obtuse or slightly notched at summit, spreading in 2 ranks or more or less erect by a twist in the very short petiole; staminate catkins cylindric, straw-yellow or red, ½ inch long or less; cones brown, oblong, rounded at summit and base, 2 to 5½ inches long, 1 to 1¾ inches in diameter; scales broad and rounded; bracts about ½ as long as the scales, rounded and finely toothed, often with a notch at the top and usually terminating in a short slender point; seed 5 lines long, its wing 6 or 7 lines long, 5 or 6 lines wide, widening toward the truncate apex."

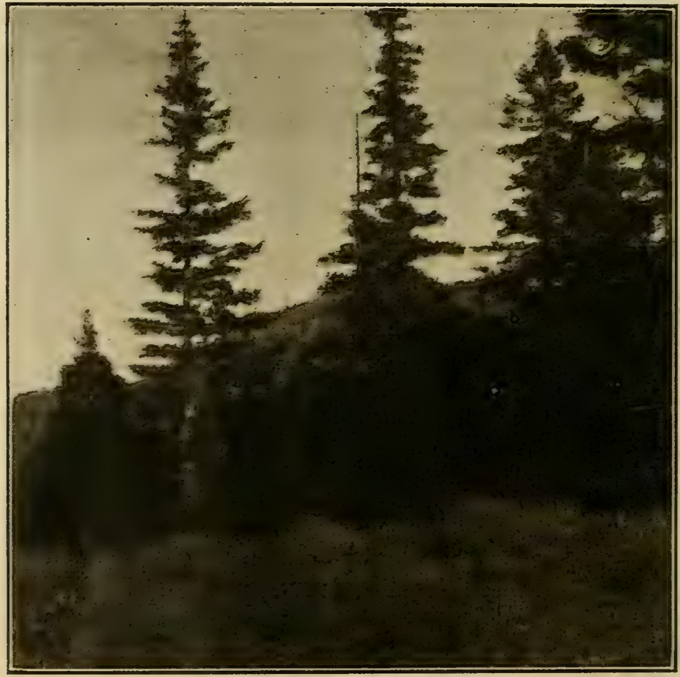


Figure 24. Abies Lowiana. Young trees near Verdi, Nevada

Not having had an opportunity to study the eastern tree, true *Abies concolor*, the original of which came from the mountains of New Mexico, I shall use the name *Abies Lowiana* for our western one. On geographical grounds alone one should expect the western tree to be distinct. True *A. concolor* ranges from Utah and southern Colorado through New Mexico and Arizona into northern Mexico. *A. Lowiana* ranges from the Cascades of middle Oregon to northern Lower California. There is no connecting link through Washington, Idaho and Montana, as is the case in all the other conifers common to both the Pacific slope and the Rocky mountain region.

The tree is common in western Nevada, scattered individuals occurring as low as 5000 feet, which is about the lower limit also of the yellow pines. At about 5500 feet it becomes more frequent, and from 6000 to 7500 feet is abundant, often being the predominant tree. With us its upper limit is about 8000 feet, where it is replaced by the red fir, *Abies magnifica*. At certain places it is rarely found above 7500 feet.

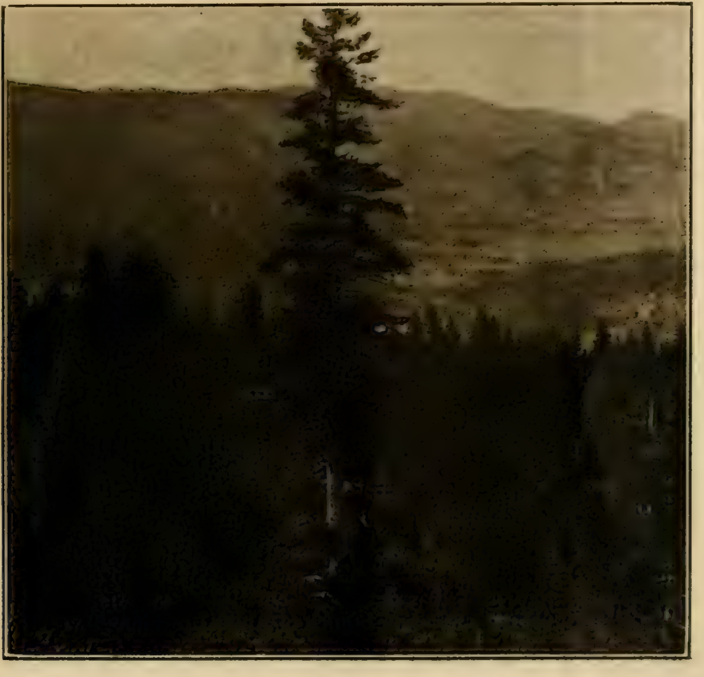


Figure 25. Abies Lowiana. Mature tree near Verdi, Nevada

At its lower limit it is found only in protected gulches along streams, but with an increase in elevation and atmospheric moisture, comes out of the ravines upon north or east slopes. It is rarely found on south slopes, even near its upper limit. It is less common in Nevada on the north side of the Truckee river than in the region south of that stream, the slope exposure not being so well suited to its growth.

The southern limit of the species in Nevada is probably in Douglas county southeast of Lake Tahoe, but it may occur in the mountains west and southwest of Walker lake in Mineral county. I have never explored that region, but as seen from the railroad, it presents a considerable forest growth. In California it is common on the east side of the Sierra Nevada between Truckee and Summit along the railroad. At elevations between 6500 and 7000 feet it is practically the only tree on the north slope which the railroad traverses, although the opposite or south slope across Donner lake is clothed with young Jeffrey pine. About Summit station, at 7000 feet, it is less common, red fir largely taking its place.

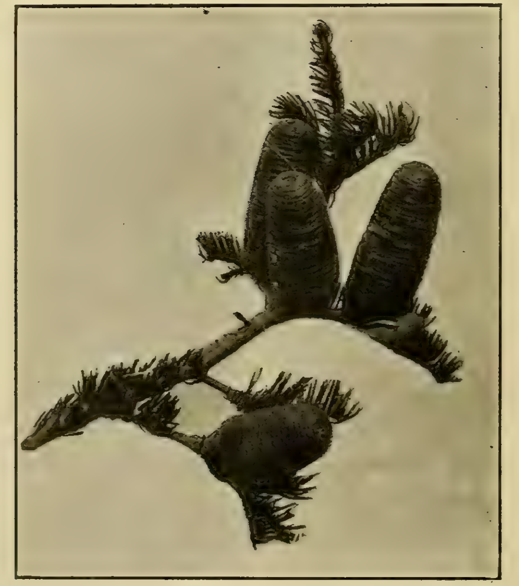
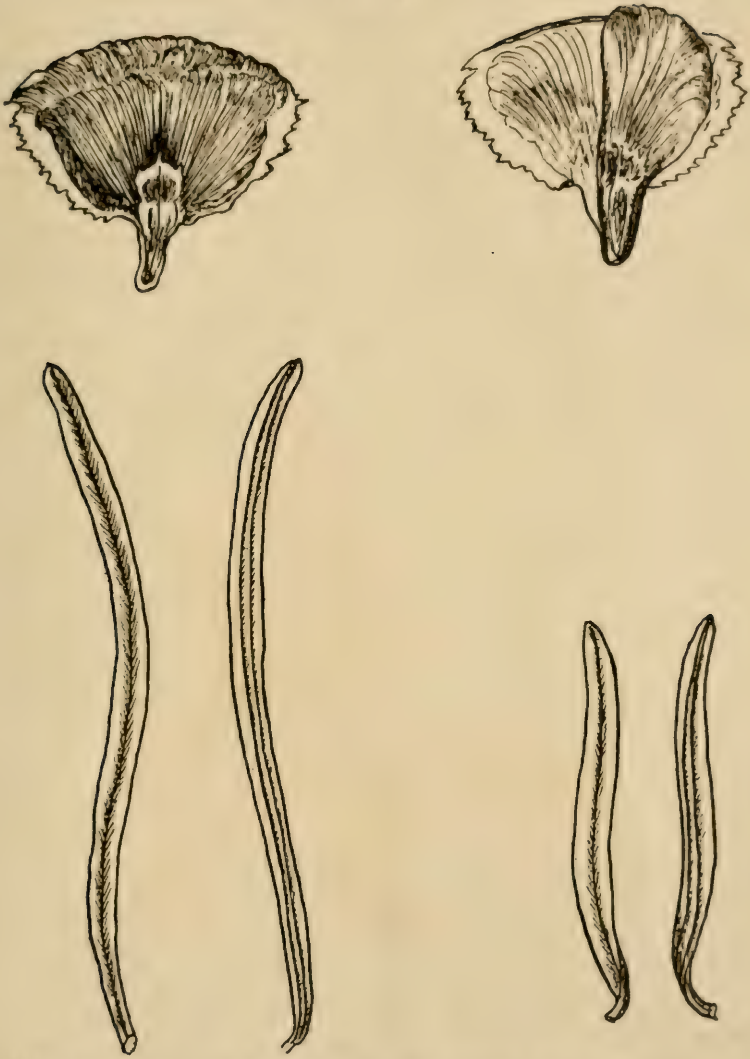


Figure 26. Fruiting branch of Abies Lowiana

Plate 15



Abies Lowiana. Cone scales natural size, showing bract and seed; long lower and short upper leaves, twice natural size

As stated before, its range is from middle Oregon to Mt. San Pedro Martir in northern Lower California. In the Coast Range of California, according to Jepson, it is found as far south only as Snow mountain in Lake county. South of that point it is absent in the coast region for a distance of 360 miles, appearing again on Mt. Pinos at the west end of the Tehachapi range. This range connects the two mountain systems in the south, furnishing an easy path for the species to follow from the Sierra Nevada. In Oregon it is found as low as 2000 feet; in northern California at 3000 feet and under along Mad river; at 1300 feet on the Feather river near Bidwell Bar on the west slope of the Sierra Nevada; in southern California as low as 4000 feet.

While the wood is much inferior to that of either the white or the yellow pines, being light and not strong, and on account of its lack of resin having a rather low fuel value, it is used rather extensively. Like all other inferior woods, it will come more into use as the better ones become scarce. Quite a bit of it is found in the cordwood used in Reno, and during the past year a good percentage of the "mill blocks" (small ends of boards and knotty and defective parts from the planing mills) consisted of white fir.

Some of it is is made into lumber for general construction purposes, and since it is easily worked and free from resin, should be fairly useful in many ways. Being inodorous it is much used for butter boxes and other food and fruit containers.

The pulp and paper mill at Floriston, California, on the east side of the Sierra Nevada, uses white fir wood almost exclusively, consuming about seventy-five cords a day. Both the mechanical and chemical (sulphite) processes are used. This tree will no doubt become one of the chief pulp wood producers of the Pacific coast.

Reproduction is good, the seeds germinating either in litter and humus as well as in mineral soil, provided there is considerable soil moisture. It is a tolerant tree, and even when suppressed for a long period will develop rapidly when admitted to the light.

The fact that it is more exacting in moisture requirements and more tolerant than either of the yellow pines or the sugar pine, with which it is associated in California and Nevada, give it a prominent place in forestry problems, both from the lumber standpoint and from that of conservation of moisture.

On south or west exposures the pines have no difficulty in holding their own, but on north slopes especially, the fir is rapidly gaining the ascendency. The slope along the railroad between Truckee and Summit, California, already mentioned, is a good example. Except on the lower parts of this slope, there are no pines visible from the railroad. No doubt pines were plentiful at one time, but they were cut down, and the tolerant firs immediately began to take possession, crowding out and killing the pine seedlings that may have come up.

This process is going on over hundreds of north slopes, and from the lumber standpoint is to be deplored. But looked at from the moisture conservation angle it is a blessing in disguise. For middle and southern California and all of western Nevada, the conservation of moisture on the higher mountains is vastly more important than the continuance of forest that will produce lumber of the highest grade. The pines are cut, usually with no reference to reproduction, the result being bare and exposed slopes from which the rain rapidly drains off and snow quickly melts. But unless there is a local demand for pulp wood and packing box material, the white fir is cut only for log chutes and such rough construction as may be necessary about the lumber camp.

Snow is the main factor in our water supply. Young firs are covered with branches from the ground up. They give an abundance of shade, but the branches are pliable enough to permit the snow to reach the ground with but little loss. It follows that in this tree we have a forest cover which prevents rapid melting and evaporation, and we have this cover best developed on north slopes, the place where it will do the most good. The growth of fir should be encouraged in every possible way in regions where the water supply depends upon the conservation of snow.

A SMALL FLOWERED MIMULUS

By A. A. Heller

Mimulus micranthus sp. nov.

Plant flaccid and weak, stems 5 or 6dm. high, often rooting at the lower nodes, quadrangular, slightly winged angled above, about 4 mm. thick, glabrous and slightly glaucescent, sparingly leafy, the lower internodes 1 dm. or more long: lower petioles 3 cm. long, 1.5 mm. wide, slightly winged, blade more or less cordate-orbicular, 2.5 cm. across, thin, dull green, glabrous, irregularly and coarsely crenate, a few small lyrate divisions at the base; uppermost leaves reduced, acting as bracts, sessile and connate,, bearded with chaffy white hairs: flowers mostly terminal, but a few scattered near the middle of the stem: pedicels very slender, the lowermost 2cm. long, the upper less than 1cm.: calyx 8 mm. long after anthesis, slightly puberulent, purple mottled, only one of the purple edged acute lobes noticeably larger than the others: lemon yellow corollas 1 cm. long, the tube 8 mm. long, cylindrical, about 1.5 mm. in diameter up to a point 2.5 mm. from the base, where it is slightly constricted, then widening and inflated but somewhat flattened laterally, 4 mm. wide, 2 mm. deep, the upper side slightly convex, the inside of the tube at this point with two channels and two conspicuous lines of yellow hairs on the lower side, the upper with two inconspicuous rows of hairs; throat nearly closed; lobes of the corolla 2mm. long, broad and rounded, the upper lip with a spread of 5 mm., its lobes curved upward, lower lip 8 mm. wide, its lobes spreading or slightly downcurved, the middle one with one or two minute red dots at the base: pods 4 mm. long tipped with the 2 mm. long style with pubescent stigma lobes: the small seeds ovoid, pale cinnamon red.

The type, my *7410*, has been lying in my herbarium under the above name since 1904, when it was collected May 13th two or three miles west of Congress Springs, Santa Clara county, California, by a roadside ditch under a wet and dripping bank. I also collected it on the hills west of Los Gatos, April 30, 1908, no. *8936*. Fragments of it have also been brought in from Los Gatos canyo.n So far I know it only as from the above mentioned places, the total range not over ten miles. While ascending, the stems are very weak. It seems to have no near relatives in the group of *M. Langsdorfii*, to which it belongs.

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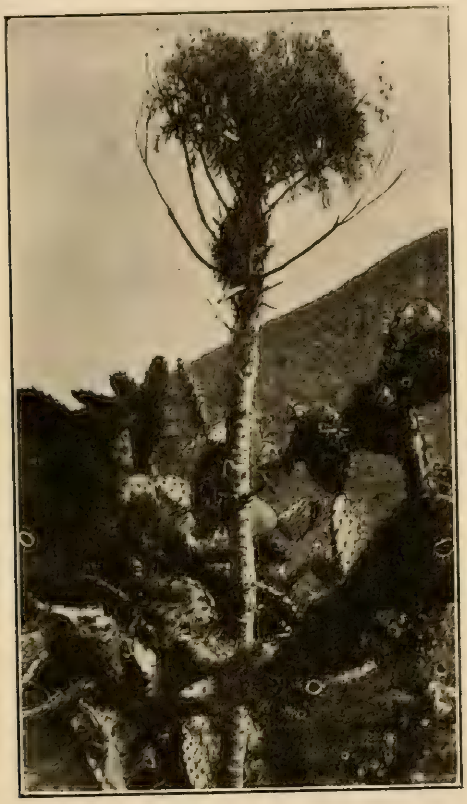
Volume 8 Number 12

MUHLENBERGIA

DECEMBER, 1912

Editors: A. A. HELLER and P. BEVERIDGE KENNEDY



Coreopsis gigantea (Kellogg) Hall

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University of Nevada,
Reno, Nevada

Volume 8 January 31, 1913

MUHLENBERGIA

COREOPSIS GIGANTEA (Kellogg) Hall

By S. B. Parish

NEW Y
BOTANI
GARD

The islands which lie off the coast of southern and Lower California possess a flora full of interest to the student of the origin and distribution of plant populations, so many are the plants, anomalous in their characters and limited in their dispersion, which are included in it. So unrelated are some of them to the general vegetation of the mainland, that they seem the relics of a remote past, here and there preserved in the midst of comparatively recent successors. That they are less adapted to present conditions than are the newcomers is evident from the fact that most of them are failing in the struggle for existence, and gradually perishing before our eyes. Some are confined to the islands, and even to a particular one of them, while others have a limited foothold on the adjacent continental shores, but in no case beyond the immediate influence of the sea.

Among these last is the curious composite here illustrated. It occurs on at least six of the islands, from Santa Cruz to Guadalupe, and is also found at some scattered stations along the coast from San Luis Obispo to Point Dusne in Los Angeles county. While it is thus one of the most widely distributed members of the peculiar insular flora, it is nowhere abundant. Probably it owes this rarity, in some degree, to the fondness of animals for its foliage. According to Lyon (Bot. Gaz. **11:** 205) even men relish its leaves as "greens."

It was first described by Kellogg, in 1873, in the Proceedings of the California Academy (**4:** 198) as *Leptosyne gigantea*, but the genus to which he referred it having recently been united with *Coreopsis*, Hall accepted the reduction, and, in his

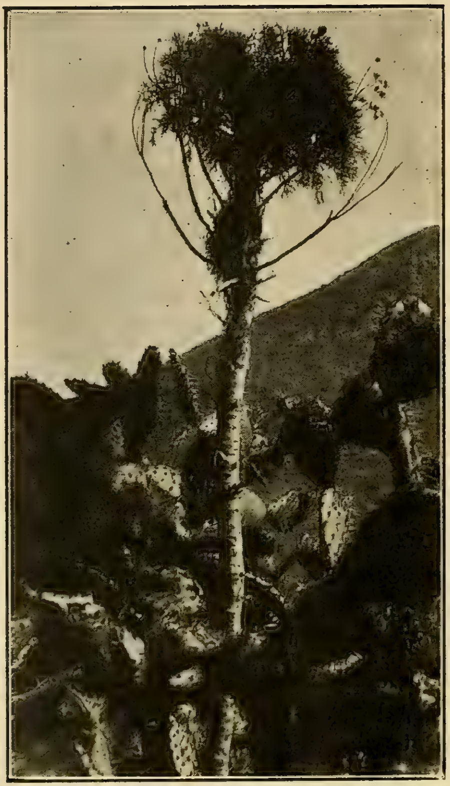


Figure 27. Coreopsis gigantea (Kellogg) Hall

Compositae of Southern California, transferred the species to the latter genus. The photograph from which the illustration was made, was taken at Hueneme, Ventura county, in March, 1894, by Mr. W. G. Wright.

San Bernardino, California.

ADDITIONS TO THE FLORA OF THE BLACK HILLS OF SOUTH DAKOTA—II

BY STEPHEN SARGENT VISHER

In Torreya for September, 1909, pages 186-188 appeared a first list of additions. In this some eight species were added to the flora of the state and some eight additions new to the Hills, though known from the eastern part of the state.

June 30, 1911, Harney Peak was visited and a small number of plants collected. These were determined by Professor Aven Nelson. Six additions to the published flora of the state can be made as a result.

July 22-27, 1912, in connection with other state survey work in the northern part of the Black Hills, in localities not visited in 1908, certain interesting plants were collected. These were determined by Dr. P. A. Rydberg. Thirteen proved to be additions to the flora of South Dakota, and three others are new to the Black Hills, though known from the eastern part of the state. Three others recorded by Rydberg, Cont. U. S. Nat. Herb. **3:** 463-536. *pl. 17-20.* 1896, in his list of the plants of the Black Hills, but not included in Saunders Catalog in Bulletin 64, South Dakota Experiment Station, 1899, are mentioned.

In the following list the nineteen additions to the state flora are printed in italic; those known also from the eastern part of the state are followed by (eastern). I am grateful to Dr. Rydberg for editing this list for me.

AGROSTIS HYEMALIS (Walt.) B. S. P.

Abundant on wet ground, especially at high altitudes. Collected near Nema (eastern). Collected near Custer by Rydberg but omitted by Saunders.

ALOPECURUS ARISTULATUS Michx.

Fairly frequent on wet grounds along the Boxelder canyon. Though recorded by Rydberg under the name of *A. geniculatus* this species is recorded only from eastern South Dakota by Saunders.

BROMUS PUMPELLIANUS Scribn.

Tolerably common on Harney Peak. Though recorded by Rydberg this species is entirely omitted by Saunders.

Koeleria gracilis

Common in the Red valley near Rapid City; rare higher.

Phleum alpinum L.

Abundant in meadows on Harney Peak.

Poa Wheeleri Vasey?

Common on Harney Peak.

Tradescantia occidentalis (Britton) Smyth

Common in wet meadows at low elevations near Rapid City; frequent near Hot Springs (determined by Nelson).

Juncus confusus Coville

Frequent along streams near Este.

Juncus Dudleyi Wiegand

Abundant on streams throughout.

Lilium montanum A. Nelson

Conspicuous in open woods about Harney Peak.

Sisyrinchium mucronatum Michx.

Abundant in grass land in the parks, etc., near Custer Peak.

Aconitum porrectum Rydb.

Common in woods above 5000 feet near Nasby, etc.

ANEMONE VIRGINIANA L.

Frequent along roads and in openings (eastern).

Aquilegia violacea (Nutt.) Rydb.

Occasional in shady woods along Boxelder canyon.

Ranunculus micranthus Nutt.

Rare along the Boxelder canyon.

Thalictrum dasycarpum F. & L.

Plentiful along the valleys.

Arabis luteola Greene

Rare on rocks, Harney Peak.

Erysimum elatum (Nutt.) Rydb.

Tolerably common along the valleys near Nasby.

HEUCHERA PARVIFOLIA Nutt.

Common on shaded cliffs about Harney Peak. Hitherto only recorded from near Rochford.

Drymocallis pseudorupestris Rydb.

In meadows on Harney Peak; not common.

Physocarpus pubescens (Rydb.) A. Nelson

Common on talus slopes of Harney Peak.

Trifolium hybridum L.

Exceedingly abundant along all roads of the northern Hills above 5000 feet elevation.

ANTENNARIA PARVIFOLIA Nutt.

Common on rocks near the top of Harney Peak (one eastern locality). Rydberg recorded *A dioica parvifolia* (*A. parvifolia*) but it was omitted by Saunders.

Arnica Rydbergii Greene

Frequent in alpine meadows on Harney Peak.

LACINIARIA LIGULISTYLIS A. Nelson. Blazing star.

Numerous in prairies on burned areas above 5000 feet; included by Rydberg in 1894 under *L. scariosa*.

LACTUCA CANADENSIS L. Fail lettuce.

Along Boxelder canyon, elevation 4000 feet; frequent (eastern).

SOLIDAGO GLABERRIMA Martens

Abundant in Red valley near Rapid City; included in Rydberg's report with *S. missouriensis*.

Tetraneuris simplex A. Nelson

Plentiful on rocks and bare ground of the Red valley.

University of South Dakota Vermillion, South Dakota.

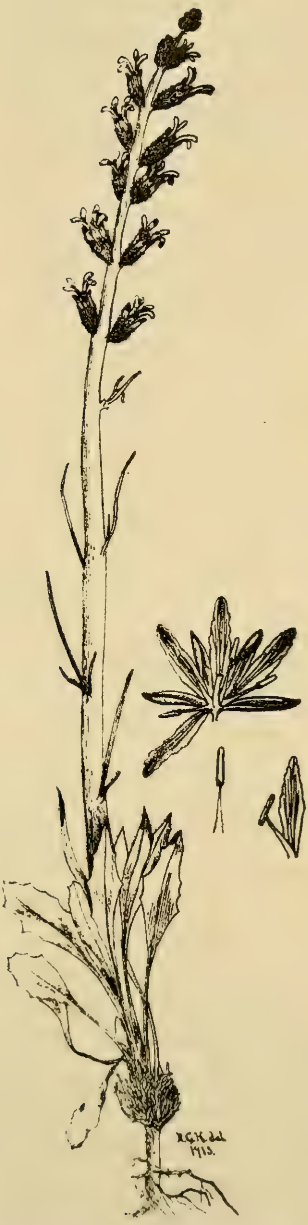
NEW WESTERN PLANTS

BY A. A. HELLER

Caulanthus senilis sp. nov.

Apparently biennial, the simple stem 3 to 3.5 dm. high including the inflorescence, fistulous, 5 to 8 mm. in diameter below the inflorescence, glabrous, glaucous and purple tinged: leaves glabrous, chiefly basal, lanceolate, elliptical-lanceolate or broadly oblanceolate, irregularly and coarsely sinuate-dentate,

Plate 16



Caulanthus senilis Heller

acute, short acuminate, or the lowermost rather blunt, 5 to 8cm. long, the blade tapering into the long petiole which about equals the blade: stem leaves reduced to linear bracts 3 or 4 cm. long, 2 mm. or less wide: inflorescence about 14 cm. long, rather loosely flowered: flowers large, 15 mm. long, about 6 mm. in diameter, subsessile: calyx pale violet, clothed with soft white chaffy hairs, the lobes oblong, obtuse, 12 mm. long, 3mm. wide, concave or low canoe-shaped, the concavity 1 mm. deep: petals 16mm. long, 3mm. wide at the middle, a little narrower at both base and apex, the part included in the calyx with a broad green band up the middle marked with three veins, the margins hyaline; the exserted portion 4mm. long, spreading, purple, hyaline margined: filaments awl-shaped, 6mm. long, 1mm. wide at base, .5 mm. at apex; anthers oblong, slightly auriculate at base, the auricles rounded, 5 mm. long, 1 mm. wide throughout, inserted on the filament 1 mm above the base: style 5 mm. long, 1 mm. in diameter; stigma lobes 2, about .5 mm. long, blunt: fruit not seen.

The type, in the herbarium of the Nevada Agricultural Experiment Station, is *Heller 10506*, collected June 25, 1912, at an elevation of 7500 feet, on the lower slopes of the White mountains, Mineral county, Nevada. A few plants only were found on a dry, stony, northeasterly exposure under and near scattered juniper and nut pine trees

This species is a near relative of *C. crassicaulis*, the type of the genus, and by some may not be considered distinct. It differs, however, if the description and illustration in Stansbury's Report 383 *pl. 1.* can be relied upon, in the sinuate-dentate instead of lyrate leaves with much enlarged terminal segment; calyx lobes of equal width throughout instead of tapering to the apex; petals of a more uniform width and not notched at the apex; anthers of uniform width instead of tapering, and less strongly versatile. It seems to normally be a much smaller plant. Geographically it should be distinct, since comparatively few species from the eastern borders of the Great Basin are found on its western rim.

Cressa vallicola sp. nov.

Diffusely erect-spreading, 2 dm. high or less, branched from the base, the branches numerous, slender, woolly-villous, as is the whole plant, even to the outside of the corolla lobes, leafy throughout: leaves elliptical, the largest 1cm. long, 4mm. wide those of the inflorescence but little reduced: inflorescence usually occupying the upper half of the branches, frequently appearing as if secund: pedicels 4 or 5 mm. long: calyx bibracteolate, the bracts foliaceous, shaped like the leaves, 3 to 3.5 mm. long: calyx 5mm. long, the lobes elliptical-obovate, 2mm. wide, blunt and rounded at the apex, strongly concave, harsh and coriaceous in texture, the inner ones but little narrower than the outer: corolla white, 6 mm. long, the tube 3 mm. long; lobes lanceolate, acutish, slightly over 1 mm. wide; overlapping a little, bearded externally: stamens equaling or a trifle shorter than the corolla, the filaments subulate; anthers 1mm. long, scarcely narrowed at apex, auricled as base, the auricles blunt: pistil equaling the corolla, style 2 parted for two-thirds its length, the united lower third woolly; stigmas capitate: ovary densely lanate, a tuft of long hairs extending up to and concealing the style to the point of division.

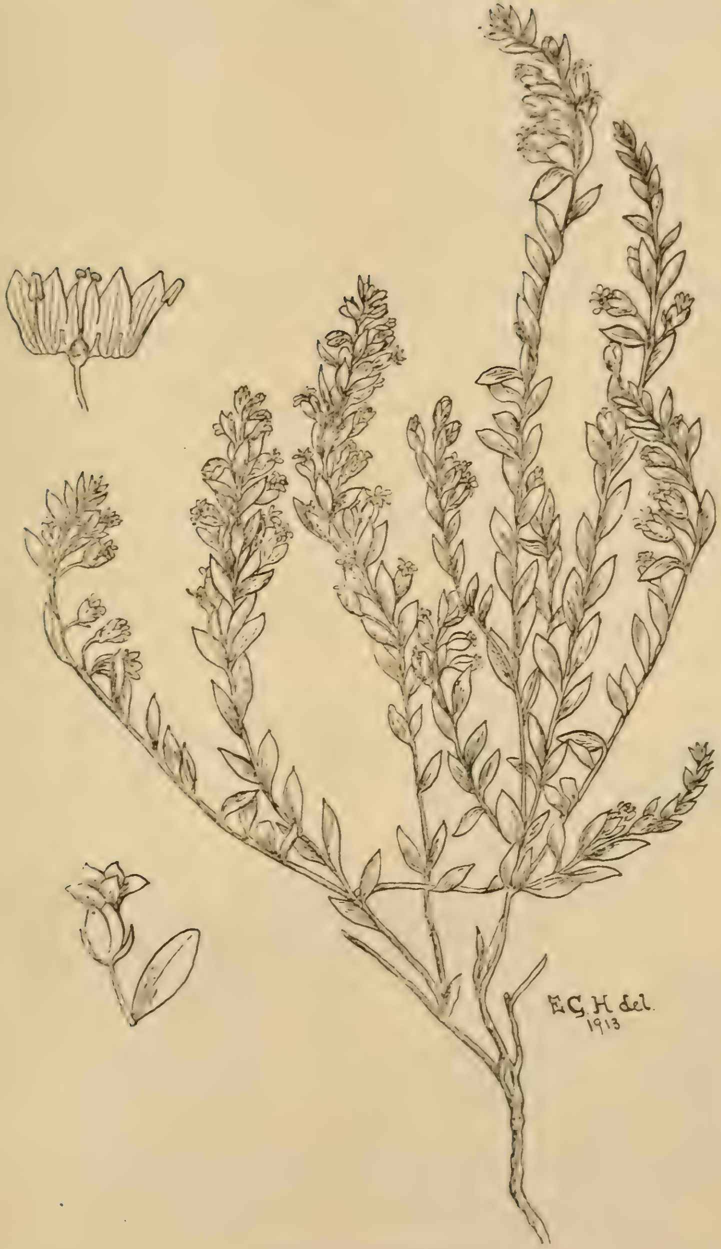
The type, in the herbarium of A. A. Heller, is *Heller 8936a*, collected June 4, 1908, a short distance east of San Jose, Santa Clara county, California, in a depression along the roadside, wet in early spring, but at that time covered with the Cressa plants.

This is no doubt the *Cressa cretica* of Jepson's Flora of Western Middle California, which is said to be "especially common in the San Joaquin Valley, often covering thousands of acres." While not at present having access to specimens of true *C. cretica*, I did study it some years ago. and am convinced that it does not occur in this country.

Cressa minima sp. nov.

Prostrate and creeping, silky sericeous throughout, the stems 3 to 7 cm. long, floriferous for half their length or more, leafy throughout: leaves elliptical-oblong, the largest 8 mm. long, 3.5 mm. wide, subsessile: pedicels short, 1 to 2 mm. long: bracts

Plate 17



Cressa vallicola Heller

foliaceous, broadly elliptical, 2 mm. long, 1 mm. wide, rounded at apex, inserted .5 mm. *below* the calyx: calyx 5 mm. long, the lobes obtuse, broadly elliptical, 2.5 mm. wide, concave, about equal: corolla white, the tube 4 mm. long; lobes broadly ovate, 2 mm. long, 3 mm. wide when fully spread out, the apex blunt and rounded, strongly plaited and overlapping at the sinus: stamens not extending beyond the corolla tube, subulate, only the upper half free, the united portion bearded; anthers 1 mm. long, the base slightly auricled, the auricles rounded and the sinus almost closed: styles 2, distinct, glabrous, a little shorter than the stamens; stigmas capitate: upper half of the ovary densely woolly.

The type, in the herbarium of A. A. Heller, is *Heller and Kennedy 8663a*, collected July 1, 1907, at Hine's ranch, north side of Peavine mountain, Washoe county, Nevada, elevation about 5000 feet, growing in a low damp place in a field.

It was distributed as *Cressa depressa* Goodding, but is smaller than that species, the pubescence much more appressed and silky, and the flowers totally different, as may be seen in the accompanying figure.

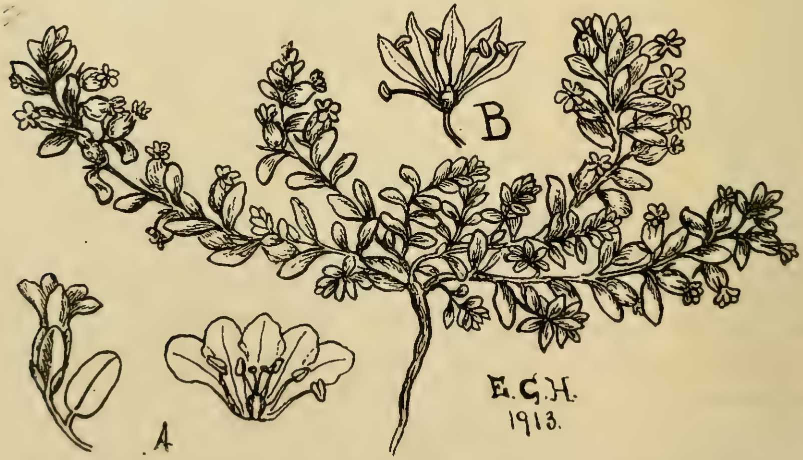


Figure 28. Cressa pumila. B. Enlarged flower of C. depressa Goodding, from the type collection.

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